SURGICAL OBSERVATIONS

ON

GUN-SHOT WOUNDS

OF THE

HIP-JOINT.

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PREFACE BY TRANSLATOR.

WHILE engaged on a visit to the various Universities and Hospitals of Germany, in the year 1874, I had the pleasure, through the kind introduction of Mr. W. MacCormac, of St. Thomas's Hospital, of making the acquaintance of Professor von Langenbeck, of Berlin.

The recent Franco-German war had afforded that eminent surgeon large opportunities of increasing his already vast knowledge of the surgery of gun-shot wounds.

Some of the fruits of that ripe experience he had recently communicated to the medical profession of Germany, in the shape of two valuable and highly interesting essays: the first memoir, entitled "Surgical Observations on Gun-shot Wounds of the Hip-joint," was read at the first German Surgical Congress, and as it contained much that was novel and striking on a subject of the highest importance to all military surgeons, and as little had been written by English authors respecting injuries of that nature, I sought and readily obtained Professor von Langenbeck's generous permission to publish a translation of it.

The second memoir, on the "After Results of Joint Resections in War," which is profusely illustrated, and which gives admirable proofs of the ability displayed by Langenbeck in resection of nearly every articulation of the extremities, I purpose to bring out shortly in a separate volume. Although the two essays were originally published together in a single volume, they are so entirely separate in their nature, that they may, with propriety, be treated as two distinct works.

I have thought it might be useful to the general reader to introduce in an appendix an abstract of Dr. G. A. Otis's "Report on Amputations of the Hip-joint in Military Surgery" (*Circular* No. 7, Washington, 1867), which embodies the experience of the war of the American Rebellion in relation to amputations of the hip-joint. For

that report, as well as for the classical volumes, "The Medical and Surgical History of the War of the Rebellion," I am indebted to the late Dr. John D. Jackson, of Danville, Kentucky, whose early death, I in common with many other English surgeons, who had the pleasure of knowing him intimately, deeply deplore. The valuable work was sent to me, at his request, by Dr. J. S. Billings, the Librarian of the Surgeon-General's Office, Washington. To use Dr. Billings' own words, "these volumes were published at the public expense for just this class of persons," and, therefore, he forwarded them, believing that they might be of service to me in dealing with this essay of Professor von Langenbeck on a difficult and unsettled question in military surgery.

I take this opportunity in acknowledging in the most grateful manner this handsome present, which seems to my mind to be, at the same time, a tribute of admiration of Professor Langenbeck as a great military surgical authority, as well as an act of international literary courtesy to the surgical profession of Great Britain.

I hold that the labour and diligence displayed by military surgeons in recording and collating such important cases as are here recorded, deserve the heartiest appreciation from the entire surgical profession, and not least from those who, like myself, are engaged in civil practice, and who, in the rare cases in which they are called upon to treat important gun-shot wounds, have to rely entirely on the experience which their military *confrères* have so abundantly garnered and utilised for them.

I trust, in conclusion, that the present translation of Professor von Langenbeck's contribution to surgery may be received by the profession in this country and in America, as a worthy effort to promote those principles of conservative surgery with which his name has been so long and so honourably associated.

JAMES F. WEST, F.R.C.S.

Birmingham, July, 1876.

SURGICAL OBSERVATIONS ON GUN-SHOT WOUNDS OF THE HIP-JOINT.

GENTLEMEN,—As the programme of this our first congress indicates, I last year undertook to impart the experience of gun-shot wounds of the different joints, which I had gained in the various wars in which Prussia had been engaged during the last five-and-twenty years, and more especially in the last great war, hoping that by such means a discussion might arise which would lead to a settlement of the principles on which these important wounds should be treated.

To-day I recoil from this task, as it is too comprehensive to be described in the time allotted me.

Abstract rules for the treatment of gun-shot wounds of the joints are not, according to my views, generally worth laying down; the treatment must rather be determined by what joint is wounded, and, again, as to each case it must be decided by the nature and gravity of the wound.

The question, upon what principles gun-shot wounds of the larger joints, as the knee and hip, should be treated, and more particularly what place amputation and resection should respectively occupy, cannot properly be answered by any of our present statistics, and many years may elapse before this will be possible. For the acquisition of serviceable statistics, the most careful criticism of each case is necessary, and the most exact knowledge, not alone of the nature of the wound, but also of the circumstances in which the wounded man was placed up to the time of recovery or death.

The difficulties with which the army surgeon has to struggle in the field, the sudden accumulation of a large number of severely wounded after a great battle, who, in the consequent confusion arising therefrom, cannot possibly ascertain the exact course of the wounds—all these circumstances increase the difficulty of his obtaining a sure basis for his statistics; more particularly is this the case in gun-shot wounds

of the hip-joint, of which one may say a thorough investigation has not yet been undertaken. As with all joint-wounds in war, here, also, the question arises, What hip-joint wounds allow the trial of an expectant conservative treatment? In what other cases, on the contrary, is resection or disarticulation at the hip-joint to be performed? And lastly, *when* are the several operations to be performed?

If we examine the ancient and modern history of military surgery, the answer is anything but satisfactory; we learn that gun-shot wounds of the hip-joint are plainly hopeless wounds, and that the wounded die, except in rare cases, just as much after one mode of treatment as after the other.

Surgical Literature of Gun-shot Wounds of the Hip-joint.—In ancient military surgical literature we find wounds of this joint seldom mentioned, so that we might infer that they very rarely occurred. This non-observance strikes one less when one takes into consideration the great difficulties which must at that time have stood in the way of a diagnosis where joint-wounds were generally very little enquired into. Apart from a case communicated by Hennen in his classical work (*Observations on some important points of Military Surgery.* Edinburgh, 1818. P. 172), and several cases mentioned by Thomson, in his "Remarks on the English Military Hospitals in Belgium, 1816," of hip-joint wounds, which seem to have progressed favourably, but were not followed up to the final issue, we find no recoveries recorded.

More recent wars have also only produced a few cases of recovery. Pirogoff assures us that during the Crimean campaigns all hip-joint wounds were fatal. From the last Italian war, Demme (*Military Surgical Studies.* Second part. Wurzburg, 1864. P. 349) relates only two cases of recovery, which, however, were not followed up by him to a perfect cure; from the American war, Hoff lastly mentions two hip-joint wounds (*Circular No. 7.* Washington, 1867. P. 74) which were cured by conservative treatment, namely, a breaking off of the edge of the acetabulum by a grooving-shot of the thigh-bone, and a gun-shot fracture of the neck of the femur. No other well authenticated recoveries appear to have taken place in the great American war. Even Otis, in his classical work (*Report on excisions of the head of the femur for gun-shot injury. Circular No. 2.* Washington, 1869. P. 122), says there was hardly a case of recovery of a gun-shot fracture of the hip-joint by expectant treatment, which did not leave a doubt in reference to the correctness of the diagnosis, and he arrived in consequence at the conclusion that expectant treatment must be rejected in all cases as soon as the nature of the injury of the hip-joint was made out. (*Op. Cit.* P. 123.) On the other hand, American surgeons, and after them the majority of recent writers on this subject,

declare primary disarticulation at the hip-joint to be hopeless, and point out that hip-joint resection in war has hardly produced one single favourable result.

With such a state of things, we cannot wonder if the army surgeon frequently does not give that attention to gun-shot wounds of the hip-joint which they imperatively demand in the interest of humanity, and for the honour of surgery. Indeed, I have often noticed during the last, as well as in the former wars, that a careful examination of these wounds was not instituted at the right time: that one did not suspect the possibility of a hip-joint injury, or that one did so only when the diagnosis became clear, and when valuable time had been lost, and the favourable period for treatment was long past. Certainly, we are justified in believing, from numberless cases of so-called hip-joint injury given in my tables, which were subjected to removal to distant hospitals, that they were not in reality at first recognised as such.

Value of conservative treatment.—I have to-day undertaken to prove to you that gun-shot wounds of the hip-joint, and even most severe cases, may be cured by conservative treatment; that in the last war not a few well-established successes have been effected, and these, without doubt, would have been more numerous if conservative treatment had been introduced in a rational manner from the moment of injury, and if it had been subsequently continued; but also, there were not a few gun-shot fractures of the hip-joint where an early (*i.e.*, before the expiration of the first twenty-four hours), free resection or disarticulation of the hip-joint became a duty.

Difficulty of forming correct statistics.—It continually happens that wounded men, having gone through different hospitals, and the same case having been attended to by different surgeons, that there is danger of re-reckoning the same case when the name of the wounded man and of the hospital where he was treated are not given—a danger I have sought to avoid by a careful examination of the cases. As a matter of course, my tables do not contain all the hip-joint wounds which occurred in the last war; I have not even been able to present all the cases I saw, as I unfortunately lost a part of my notes after my return from France.

Exact statistics of hip-joint wounds, and the results, could not be given unless official statements were forthcoming from all the armies that took part in the war. It is necessary, for a successful treatment of hip-joint wounds, that the surgeon should decide after the first examination if conservative treatment be admissible, or if operative interference must be resorted to.

Importance of early diagnosis.—On this account it is important that hip-joint wounds should be quickly recognised, and here weighty

difficulties offer themselves. There are gun-shot wounds of the hip-joint of which the proof cannot be determined until the beginning of the infiltration and inflammatory period. I have seen gun-shot fractures of the hip-joint, of whose existence we were convinced, but of which, however, it was impossible to obtain the neccessary indications for appropriate treatment, and where the further progress of the joint-wound or dissection alone removed all doubt as to the accuracy of our diagnosis. Among the hip-joint injuries which are with difficulty or are not positively discernible directly after injury, are gun-shot contusions of the hip-joint, various cases of simple capsule wound, where the joint-capsule is opened in an inaccessible place, the lodgment of the bullet in the neck or head of the thigh bone, penetrating gun-shot wounds of the neck of the thigh, and more particularly incomplete fractures of the neck of the femur, and lastly, the breaking off of pieces of the margin of the acetabulum, and injury of the acetabulum without implication of the head of the femur. An attentive consideration and examination of the wounded part and a careful estimate of the anatomical position of the hip-joint, and also the direction in which the shot canal runs, will, in most cases, enable us in these wounds to make a positive or else a probable diagnosis. Actual non-penetrating injuries of the hip-joint I have never seen ; they are, perhaps, as seldom met with as the erroneously accepted contusions of the knee-joint, for, since the introduction of arms of precision, and in consequence of the far greater speed of the present projectiles, such non-penetrating injuries are quite rare. Cases have, however, come under my notice which were thought to be contusions, and only later became known as hip-joint injuries. The case *No.* 8, in *Table III.*, belongs to this category.

Mode of determining Situation of Hip-joint.—It is known that the position of the hip-joint may be demonstrated if we construct a triangle whose base intersects the trochanter major, while the femur and the anterior superior spine of the ilium form the points of an acute angle. If the entrance or exit of the shot is within the compass of the triangle, or if the direction of the shot canal falls within this space, then the hip-joint will probably be implicated. The joint will be most directly involved when the bullet penetrates close below the anterior inferior spinous process, or nearly 1⅝-inch below the anterior superior spine of the ilium, and in the direction of the median line. The spongy part of the head of the femur will be injured in such a case, and, as a rule, smashed to atoms. If the shot has struck the body at an oblique angle, then the extent to which the joint may be involved is far larger, and the wound may occupy nearly the entire front of the thigh from the symphysis pubis to the trochanter major. If the entrance of the bullet be close below, and external to the spine of the

pubis, and if its exit be in the region behind the trochanter major of the same side, as a rule, the hip-joint will be implicated with probable separation of the edge of the acetabulum. When the entrance and exit wounds are in front or behind the trochanter major, injury to the neck of the femur, with opening of the hip-joint capsule, may be assumed for certain. With shots taking this direction we may also find perforating shot wounds of the neck of the femur, as represented and described in one case by Lücke. (*Military Questions and Remarks.* Bern. 1871. P. 68.) These cases may be without any splintering; but, of course, there is generally opening of the joint, with breaking off of small fragments of bone, with occasional splintering up into the head of the femur, and sometimes with destruction of the neck of the bone.

Gun-shot wounds of the Trochanter Major.—Gun-shot wounds of the trochanter major, and even shot grazing of the entire surface of this important projecting part of the bone, should always be watched with the greatest care, and in any case be treated as hip-joint wounds. As the projecting point of the trochanter major in the outline of the thigh shows the centre of the hip-joint, so the bullet may lodge in the joint if it is projected in that direction. The dilatable bone substance allows the bullet to press forward into the joint without leaving behind a shot canal that will fairly admit the probe, and one is too easily led to believe that the ball has passed through or fallen out of the apparently short shot canal. In 1864 we treated one of our soldiers, into whom a Minie bullet had penetrated exactly at the apex of the left trochanter major. The wounded man stated that the bullet had fallen out, and it was quite impossible to force the probe far into the neck of the femur. The supposition that the bullet might remain in the joint, as in the neighbourhood a limited swelling was perceived, induced us to undertake a second and more careful examination. The active and passive movements were painful; but as easily performed as those of a healthy joint, and the wounded man could walk perfectly well. Death followed through septicæmia, and *post-mortem* examination showed that the bullet had penetrated through the whole length of the upper part of the femur to the acetabulum, only just escaping the round surface of the head of the femur, and without causing splintering of that bone. (This specimen is in the collection of the Royal Frederick William Institution.) A similar case is related by Klebs (*Table II., No.* 51) in the Pathological report. The bullet, entering at the apex of the trochanter major, had perforated the neck and head of the femur without leaving an accessible shot canal, breaking a round piece from the inner margin of the acetabulum and piercing the obturator foramen. Gun-shot wounds, with fracture and separation of pieces of the trochanter

without injuring the joint may cause splinters to enter the joint, and fatal joint suppuration may show itself later on. *(Harold Schwarz, Contributions to the Study of Gun-shot Wounds.* 1854. P. 143.*)* In like manner, I think, I must not omit to mention the grazing shot of the trochanter major described by Goltdammer (*Table I.*, 16), which was followed by inflammation of the joint, and the communications of Klebs and Arnold (*Table II., No.* 52, 68) offer us a series of similar cases. The hip-joint is also accessible from the entire gluteal region, supposing the bullet to have entered through a more or less obtuse angle.

Diagnostic difficulties owing to site of Shot Canal—The difficulties in the way of forming a diagnosis are particularly great in those cases where the shot has entered the hip-joint from the cavity of the abdomen, and has lodged somewhere. Harold Schwarz (*Op. Cit.*, p. 143) notices a case in the Schleswig war, where the bullet entered through the great sciatic notch, and fractured the acetabulum of the same side, and where the wounded man died from suppuration of the hip-joint and inflammation in the cavity of the abdomen. I shall, further on, relate more fully a similar case of injury.

A careful estimate of the angle of incidence of the shot, and the consideration that the projectiles used in the present mode of warfare seldom deviate from their course, must suffice in these cases for the examining surgeon.

Besides the great vessels of the groin, the wounding of which, in most cases, is at once fatal on the battle-field, and the crural plexus of nerves, whose implication one recognises by the certain paralysis which results, other organs near the hip-joint may be wounded, especially the bladder and the rectum.

Contemporaneous injury to Bladder and Rectum.—I have seen four cases of these injuries, and, indeed, three of simultaneous wounding of the rectum and the hip-joint (*Table I., No.* 1., *Table III., No.* 6), one with contemporary wounding of the bladder and of the rectum (*Table I., No.* 3); a fifth case of injury to the hip-joint and to the rectum is also given by Socin (*Table II., No.* 14). In a case seen by me in 1866 a wound of the hip-joint was not discovered until a *post-mortem* dissection had been made. I relate this case here fully, as the symptoms of the joint injury were sufficiently plain, and must have been recognised if we had made an unprejudiced examination. T., Prussian major, was wounded June 28th, 1866, at Munchengrätz, by a Minié bullet. The shot had entered in an oblique direction from left to right, and from above downwards, had perforated the abdominal wall on the left side, then passed inward and under the anterior superior spinous process of the left ilium, and had not passed out. The flow of bloody urine by the natural passage, and through the wound in the belly

soon placed the wound of the bladder beyond a doubt. The wounded man was transferred to Zittau, where I saw him in August. The urine partly passed spontaneously through the urethra, and partly through the abdominal wound. The appearance of peritoneal irritation, which was manifest at first, had quite subsided. The clear urine flowing through the abdominal wound was only partly mixed with matter; but this, in a more especial degree, occurred when pressure was made on the right side. However, there had been lately more fever, and the patient was somewhat weakened through protracted decubitus on the sacral region. This arose through the immovable position which the patient had been compelled to adopt since his reception into the hospital at Zittau. Every movement of the body occasioned the most severe pain in the right hip-joint and down the right leg, and the patient, therefore, had carefully avoided any alteration of his posture. On examining the right groin I found the femur flexed at an angle of 45°, and strongly rotated outwards. The patient experienced great pain on trial of passive motion. At the lower part of the inferior spine of the ilium there was a tolerably defined fluctuating swelling, through which the femoral vessels had been pushed forwards, so that the artery pulsated close under the skin. I believed I felt through this fluctuation a limited hardness, and concluded that the bullet had wounded the front surface of the bladder, passed under Poupart's ligament, and remained lodged under the femoral vessels, and consequently I advised laying open the fluctuating swelling to remove the bullet.

As Dr. Karstensen, the directing physician of the division, had the goodness to tell me later, the abscess increased considerably, and the skin had reddened by September 2nd; a larger incision was then made, which gave exit to much healthy matter, to urine, and a large quantity of dead fascia tissue. The finger of the surgeon arrived at a wide-spread abscess, and beyond that at a long canal running in the direction of the bladder, the end of which could not be reached. The expected bullet was not found here.

From that day the urine only passed by this opening, the spontaneous flow of urine having discontinued. The cleansing of the bladder, and of the urinary fistula, was accomplished by daily irrigation through the catheter, and the matter for several days remained wholesome; the general health was good, the decubitus sore healed over, and passive movement of the hip-joint was performed much less painfully than before, and in a less protracted manner. Then suddenly a remarkable change ensued; without any warning, on the morning of the sixth day after the incision, the wounded man was seized with rigors of extraordinary intensity and duration, slighter shivering fits and convulsions followed; the discharge from the

wound became offensive and foul, the wound itself was of a disagreeable colour, and the appearance of the patient ashy; he soon lost consciousness, and on the morning of the 13th September the patient sank into deep coma, and died on the seventy-seventh day after the injury.

Post-mortem examination showed that the body was well nurtured and fat, that the bullet, piercing in the first place through the left side of the abdominal wall, had grazed the bladder on its anterior surface, and formed an opening, of oblong form, through which the finger could hardly pass. Then it continued onwards deeper, always remaining extra-peritoneal, breaking through the right acetabulum at its upper and anterior margin, and in a direction from within outward, and finally had opened the hip-joint. The bullet must have split, and rebounded on striking the pelvis and become divided into two parts, for only the larger piece, about two-thirds of the whole shot, was found inside the pelvis, close to the bone, about three inches below the perforation of the acetabulum, while the smaller piece of the bullet could not be discovered. The hip-joint itself was quite sloughy; in the surrounding soft parts infiltration was spreading. At the back and outer side of the femur as far as its middle, there was a deposit of urinous matter. An impression of the bullet was not discernible, in consequence of the suppuration on the roughened head of the bone.

The appearances of the wound of the hip-joint, to which I shall presently recur, were here so well marked, that it is incomprehensible how they had been so completely overlooked. Certainly a wound of the hip-joint had been suspected by the physicians in charge, when pains in the joint and in the thigh had become extremely severe, and when rotation of the limb had also been noticed. This question also forced itself upon me, but I was kept in a state of uncertainty by the supposition that lodgment of the bullet in the groin might have caused the same appearances.

If with gun-shot injury to the hip-joint, complicated by a wound of the bladder or of the rectum, there are perfect shot canals, with apertures of entrance and exit, then the passage of urine mixed with synovia or fæces through the joint wound, facilitates the diagnosis. Immediately after the injury one does not, as a rule, notice the appearance of the above-named excreta, and yet the early recognition of this complication is of importance, because the artificial emptying of the urine or of the fæces, by the catheter or by injections into the rectum, is indicated. Wounding of the hip-joint and of the bladder may be presumed as soon as one sees the shot openings lay in an imaginary line, drawn from the front of the upper thigh above the anterior inferior spine of the ilium, to the ischiatic notch of the opposite side. The same injury may be expected if the shot open-

ings fall in a line, drawn from the tuberosity of the pubis, to the ischiatic notch, or the tuber ischii of the same side. Should the shot canal run from the edge of the sacrum to the tuberosity of the pubis of the left side, the rectum may be implicated near the wound of the hip-joint and of the bladder. Finally, hip-joint and rectum may be affected singly, the bladder may be spared when the bullet has gone in close under Poupart's ligament, outside the femoral artery of the left side, and come out through the sacrum. (*Table II., No.* 14.) One would suppose that with wounding of the bladder from the hip-joint there must always be extensive fracture of the parts, as the head of the femur and the acetabulum lie in the course of the shot. This, however, is not so. In both cases seen and cured by me (*Table I., Nos.* 1, 3) there was certainly no comminuted fracture of the head of the bone; in a third case seen by me the head of the femur was quite whole, and only the cup of the acetabulum shot through, although the projectile (a Minié bullet) had passed through the groin into the joint.

Simon's Experiments.—(*Table III., No.* 6.) This case reminds us forcibly of Simon's splendid experiments, which show that a bullet may pass between the articular surface of the femur and the tibia without wounding them. By the very close approximation, however, in which the surfaces of the hip-joint stand to each other, it is a very great matter of surprise how a bullet, after breaking off a piece of the edge of the acetabulum, can penetrate and bore through the inner surface of the acetabulum without wounding the head of the femur; and yet this is without doubt possible, and has been proved by the resection undertaken by us.* In all probability the atmospheric air is drawn out with such force in the opened joint by the breaking off of the edge of the acetabulum, that the joint head is thrust from the acetabulum, and so out of the way of the shot; as in my case, the lig teres was not lacerated; at any rate, I effected the division of the lig. teres and the withdrawal of the head with astonishing facility. Equally improbable appears a gun-shot wound of the hip-joint described by Becher (*Table II., No.* 20), where the bullet passed in front and through the groin without fracturing the edge of the acetabulum, and merely caused a flat shot furrow on the head of the femur, and remained flatly pressed between the head of the bone and the acetabulum without, however, opening the joint.

Lodgment of Bullets.—In wounds of the hip-joint blind shot canals frequently occur. In the forty cases of *Tables I.* and *II.*, in which this kind of wound is mentioned, the aperture of exit is wanting in

* Note by Translator.—I myself once treated a case of gun-shot wound of the wrist joint in a young girl, in which a Minié bullet passed completely through the articulation without injuring either the radius or any of the carpal bones, and in which recovery followed with very little impairment of the usefulness of the joint.—J. F. W.

thirty-one cases, the shot remaining lodged either in the bony parts of the joint, or in the cavity of the pelvis, or finally in the soft parts surrounding the joint. If Lücke means (*Op. Cit.*) that the lodgment of the ball does not make much difference, I agree with him in so far as joint wounds are concerned; I grant that a bullet may remain in the joint, and the wound may heal without causing considerable inconvenience through its presence. I removed a bullet from the left knee-joint of an officer in the fifty-second infantry regiment (Lieutenant W.) in my clinique, January 16th, 1873, which had been there since August 6th, 1870. The shot had entered close above the head of the fibula over the outer condyle, had penetrated the hinder part of the capsule, grazing the posterior surface of the condyle, probably breaking off the inner condyle, and had remained stationary in the joint in the inner part of the inner condyle. The subsequent, rather severe joint inflammation passed off favourably, and the movement of the joint was so perfectly preserved, that the wounded man was able to return to active service in the autumn of 1872. The joint, however, could not stand the exertion of active service, it swelled slightly, and required several days' rest before it could be used again On examining the knee joint I found the transverse diameter (probably in consequence of the fracture of the inner condyle) considerably greater, and the obviously flattened bullet, not unlike a flat articular cartilage, on the inner surface of the inner condyle, close above the articular surface of the tibia in the somewhat enlarged joint-capsule, and so movable was it that on striking with the finger against the bone one could distinctly hear a rattling noise. About a tea-spoonful of synovia passed through the opening made by the bullet, and the perfectly flattened ball was taken out by means of the elevator. The wound having been carefully closed with sticking-plaster, healed, while the extremity was kept immovable with plaster of Paris bandages without any further trouble, and the patient is now perfectly able to bear the fatigue of active service.*

Under similar circumstances it is certainly possible for the bullet to lodge any length of time in the hip-joint, but one must always look upon the lodgment of the ball as a critical complication, and keep a sharp look out for resection should the structure of the bone be injured. Our tables show us that in thirty-two fatal cases the ball remained lodged twenty-six times; out of eighteen cases of hip-joint

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* Note by Translator.—In reference to the length of time bullets may lie dormant in important parts without producing any mischief, I may mention the case of an old soldier in whose hand, between the bases of the first and second metacarpal bones, a bullet had lodged since the battle of Waterloo, in 1815. This bullet would probably have remained in situ until the man's death, had he not, in digging, struck the part with the handle of his spade. An abscess then formed, which I opened, and from it I extracted a spherical ball, which had, doubtless, lodged there for nearly sixty years, producing little pain or inconvenience.—J. F. W.

injury, which ended favourably, the bullet only lodged seven times, and in eleven passed out. It will suffice for the proper management of the case to determine by the position and direction of the shot canal, whether the hip-joint is wounded, it being understood that all such wounds as hip-joint injuries are to be treated by forbidding all further transport, and by assiduously keeping the joint immovable; for early settlement of the question as to whether, in any case, conservative treatment is likely to succeed, or whether primary resection should be carried into effect, it is always of the greatest importance to determine as carefully as possible the existence of a wound of the joint, and the exact character thereof.

Points of resemblance between civil and military practice as regards joint injuries.—In consequence of the smallness of the bullets at present in use, the shot canal is generally inaccessible to the finger of the surgeon, and the introduction of probes, &c., is continually attended with no small difficulty, so that we are particularly called upon to observe those appearances which are characteristic of joint-wounds. These phenomena are the same, both as to wounds and as to organic injuries of the hip-joint, as one sees in civil practice, and the diagnosis of such cases of hip-joint affection is indeed no easier in that kind of practice than it is in that of war.

Symptoms.—Gun-shot fractures of the hip-joint with complete separation of the head or of the neck of the femur naturally present the same characters as fractures of the neck of the thigh in civil practice: the wounded man falls to the ground, does not endeavour to rise, the point of the foot turns outward, and shortening of the limb is more or less marked. As in incomplete fracture of the neck of the femur in civil practice these symptoms are often wanting, and consequently diagnostic mistakes continually take place, so in a gun-shot fracture the full extent of the injury cannot be discovered if the shattered parts of the bone still hold together. That with such wounds active and passive movements of the joint may be interfered with to a certain degree, is only probable, and experience teaches that cases of extensive shattering of the neck of the femur, with complete separation of the same, are sometimes treated as simple flesh wounds, and their proper importance is only clearly shown on the exfoliation of bone fragments. But even with such wounds characteristic appearances are not wanting. Passive movements are painful directly after the injury, and very severe pains in the joint result therefrom. If the patient walks about, he steps with the extremity rotated outwards, and with the hip-joint rather bent, and he is sensible of pain in the joint, or in the knee, or in both places together. (*Table I., No.* 4; *Table II., Nos.* 4, 5.)

It is, of course, different with simple capsule wounds without injury

to the osseous parts of the joint; in them both pain in the joint and functional disturbance may be absent at the commencement. The joint capsule is placed near the edge of the acetabulum, only a little behind the free edge of the cotyloid ligament, and is only close to the head of the femur, where it is not enclosed by the acetabulum. Over the whole of the neck of the femur the attachment of the capsule is loose, and especially close above the trochanter, and in this situation, doubtless, gun-shot wounds of the joint capsule may occur without the bone being injured. With favourable position of the wound openings, with prevention of admission of atmospheric air, with quiet behaviour on the part of the wounded man, that kind of simple capsule wound may heal without anything further happening, and consequently in such cases the diagnosis cannot always be clearly made out. But when inflammation and effusion begin in the wounded joint capsule, the articular cavity and the head of the femur are so completely separated from each other that at first easy movements of the joint surfaces against each other are not much interfered with. The case of an aperture made by a shot in the neck of the femur, remarked by Lücke, is very instructive in this respect. (*Table II., No.* 24.) The joint only became painful on the twentieth day after the injury. The movements were perfectly easy and free until his death on the twenty-second day, although the articular capsule was filled with thick purulent synovia.

The discharge of synovia from the wound is absent more frequently than is noticed; one remarks it with gun-shot wounds that go direct into the joint from the groin, but not with those where the wound apertures lie further back; the absence of discharge of synovia does not prove that the hip-joint is uninjured. Only when inflammation in the joint is beginning and the articular capsule is widely dilated, one may occasionally, by pressure, cause the discharge of synovia, or one may recognise it by the synovia being mixed with inflammatory exudation.

One distinct sign of injury to the joint, on the contrary, is the swelling of the articular capsule, which is noticed at all periods of joint injury, and which either depends upon the distension of the articular capsule by blood and synovia, ichor and pus, or on the swelling of the fibrous articular capsule. This condition does not easily escape the notice of an attentive observer, and is most plainly witnessed in the neighbourhood of the groin where the articular capsule is more superficial and where the layers of muscle which cover it show interruptions, *i.e.*, within reach of the large femoral vessels, which are forcibly lifted by the continually swelling capsule, so that the femoral artery seems to beat close under the skin. As there are large arteries in the neck of the femur, hæmorrhage into the joint may be considerable,

and the expansion of the articular capsule is more distinct the more distant the openings of the narrow shot canals are from the joint, as from this cause the discharge of blood is rendered more difficult. Since my attention was drawn to this appearance (1866), I have noticed it immediately after a wound in a case of gun-shot fracture of the neck of the femur; but in several others I have failed to discover it so early, and, indeed, could not perceive it at all in consequence of the excessive enlargement of the whole of the upper part of the thigh, arising from infiltration. I have, on the contrary, never missed it during the period of suppuration, nor when acute sloughing of the joint had arisen, and have even discovered it long after perfect recovery from the joint injury. (*Table I., Nos.* 1, 2, 5, 7.)

We find, again, in gun-shot wounds of the hip-joint, during periods of inflammation and suppuration, quite analogous symptoms to those witnessed in the coxitis and coxarthritis of civil practice, with this difference, that they advance with far greater violence than in the latter class of cases. The pains are more severe, and the accompanying fever higher than I have almost ever seen in civil practice. They are principally in the joint, but usually extend over the entire limb. In a case of acute suppuration after contusion of the femur, the pains were the same as those of the most severe sciatica, so that the bullet was believed to be in the neighbourhood of the sciatic nerve, an opinion which was afterwards proved to be wrong. (*Table II., No.* 21.) Neuralgic pains in the course of the sciatic nerve were noticed by Schinzinger in a case (*Table II., No.* 9) in which the hip-joint injury was not known during life, where the bullet had passed through the upper and back part of the acetabulum into the cavity of the pelvis, and remained fixed in the psoas muscle. In another case noticed by Kirchner and G. Fischer (*Table II., No.* 17), severe pains were caused by injury of branches of the crural nerve; dissection showed splintering of the head of the femur with wedging of the ball in the acetabulum. In a case of suppuration of the joint, described further on, there were severe pains in the joint, although here the acetabulum alone was wounded, the head of the femur remaining intact. Stromeyer (*Experiences of Gun-shot injuries, in the year* 1866. Hanover. 1867. P. 52) saw a wounded man who, the day before his death could bend and stretch the thigh at the hip-joint, although the joint was quite suppurating. As it appeared, a gun-shot wound had displaced the bones of the pelvis, from which splinters had burst into the acetabulum, and from this observation Stromeyer draws the conclusion that, by splintering of the acetabulum, the occurrence of coxitis and the consequent pains are much less severe than in gun-shot fractures of the neck of the femur. But even in gun-shot fractures of the head of the femur these pains are often absent, and

we must not on any account, from the absence of pains and the continuance of the power of walking, suppose that the joint is uninjured, for in seven cases the wounded had the power to accomplish active movements, to stand, to walk (*Table I., No.* 4; *Table II., Nos.* 3, 4, 6, 20; *Table III., No.* 8); and in a case noticed by Fischer, the wounded man could even run (*Table II., No.* 5), and four days before death could stand on both legs, although the head of the femur was split in two. Finally, in a case noticed by Lücke (*Op. Cit.*, p. 65. *No.* 58), a wounded man sent from Saarbrücken to Darmstadt, some time after the injury, walked from the station at Darmstadt, to Bessungen (a suburb of Darmstadt), whose acetabulum was shattered, and in whom a piece of the upper end of the femur was broken off. (*Table II., No.* 24.) (Compare also the records of the Military Society in Orleans, 1871; and the *German Military Journal.* First year. 1872. P. 478.) The pain in the knee, so usual in chronic inflammation of the hip-joint, is often absent in traumatic coxitis, particularly when this is very severe. I have noticed the same thing in organic maladies of the hip-joint when the inflammatory symptoms were very acute. Childen generally call attention to the entire extremity, and to the outside of the femur as the seat of the severest pains. The objection sometimes raised that the rest and the care taken for the proper position of the injured extremity are the reasons why the pain in the knee is usually absent, is set aside by the circumstance that I have never seen it produced by strong flexion of the limb. It appears to me that the pain in the knee is very unjustly assigned to straining of the muscles. I have seen it appear in spontaneous hip-joint inflammations, which were treated by the extension plan, and where there could be no question of muscle straining or faulty position of the limb, and disappear as soon as the inflammation abated.

It may be taken for granted that a gun-shot injury of the hip-joint may heal under favourable circumstances without traumatic coxitis beginning. Coxitis may certainly be avoided in simple capsule wounds, which are kept perfectly quiet from the commencement, as well as in gun-shot injury of the knee-joint, as I have seen the recovery of several cases without any inflammation arising. As, however, in most cases (Pott's) side splint was recommended by the surgeon or adopted by the patient, and as during the last war not a few of the men were subjected to distant transport, and, injury of the hip-joint not having been discovered, were allowed to go about, it was difficult in such cases to avoid inflammation. It appears to me that we must admit that in all those cases in which coxitis suddenly appears a considerable time after the injury, recovery is certain under favourable external circumstances without any further trouble occurring. (P. 18.)

Here I may also mention a case related by Billroth, which showed so few signs of bone or joint-injury that a simple flesh wound was taken for granted. Four weeks later, after transport from Weissenburg to Mannheim, symptoms of joint-injury appeared, which caused the patient's death. (*Records of the Second German Surgical Congress.* Berlin. 1873. P. 24. *Berlin Medical Wochenschrift,* June 7th, 1873.) Moreover, as traumatic coxitis appears at very different times and with different intensity according to the severity of the wound and to the general health of the wounded man, it appears unnecessary to me to make an exact estimate of them. From my observations I should say that joint inflammation shows itself most frequently between the seventh and fifteenth days. In any case inflammation appears in simple capsule injuries and in gun-shot fractures with opening of the joint capsule, especially when the latter is filled and distended with much extravasated blood, generally in the form of purulent synovitis, much earlier than in the no less frequent cases where the injury is confined to the osseous structures of the joint, and where the joint itself only becomes secondarily inflamed. Fissures which, extend through the articular cartilages, are curable, and are frequently cured, when the chief injury of the adjacent part of the bone heals favourably. As, however, in consequence of the injury to the bony diaphyses, purulent osteomyelitis often appears very late, so the joint, which up to that time had been considered uninjured, may, during the progress of the case, even after several months, become thereby involved and inflamed. In this respect gun-shot injuries of the interior of the bone, as of the trochanter major, must under all circumstances be considered dangerous, because in such cases joint fissures so frequently occur. Of the danger of gun-shot injuries of the trochanter we have already recorded instances, and our tables contain several similar cases. A later appearance of coxitis, even at a time when one no longer expects it, may be discovered by the secondary inflammation, extending from the medulla of the diaphysis of the injured femur to the originally quite unwounded part. These secondary inflammations occur in all joints, and from the experience of the last war, instructive cases of this nature have been reported by Lucke (*Op. Cit.*, p. 65). Cases of high splintering of the femur close below the trochanter are particularly dangerous to the hip-joint. Goltdammer (*Account of the Garde Ulanenkaserne in Moabit.* Berlin, Klin., Wochenschrift, 1871. No. 12; and *Maas Military Surgical Contributions* Breslau, 1869. P. 44, No. 126) report observations of this kind. But gun-shot fractures of the diaphysis of the femur at the junction of the upper and middle third often lead to a secondary inflammation of the hip-joint, as George Fischer observed (*Dorf Flomg and Schloss Versailles.* Leipzig, 1872. P. 76, No. 47).

Through the kindness of the surgeon-major, Dr. Neubauer, I have received reports of four gun-shot injuries belonging to this category, which I consider ought to be mentioned here, as some of them (Nos. 1, 2, 3) may be considered as injuries of the hip-joint (splinters in the joint).

I. John Albert, grenadier, First Guard Regiment, wounded August 18th, 1870, a St. Privat. Gun-shot fracture of the right trochanter major. Shot entered close under the groin. Bullet cut out with much bone splintering above the trochanter major, September 11th, 1870. Permanent extension was exchanged on November 2nd, for the plaster apparatus. When he entered the Wilhelm's Hospital at Wiesbaden, in the summer of 1872, the femur was shortened to the extent of four inches, the trochanter major was much bent outward. Not much power of movement in the hip-joint. After the use of thirty-seven thermal baths, he was enabled to use his legs with greater facility.

II. Robert Wilde, Brandenberg, Fusilier Regiment, No. 55. Complete ankylosis of the left hip-joint in consequence of shattering of the trochanter major. Only able to walk with the aid of two sticks. No shortening. Great pain in the neighbourhood of the hip-joint. The pains and the power of walking much improved after six weeks of the bathing cure.

III. Felix von Rentz, Lieutenant in the Second Hanoverian Infantry Regiment, No. 77 Complete ankylosis of the left hip-joint after gun-shot fracture of the neck of the femur. Wounded August 6th, 1870, at Spicheren. Walks with two sticks.

IV. Heinrich Feldsmann, Hessian Fusilier Regiment, No. 80. Wounded August 6th, 1870. Gun-shot fracture of the right femur just above the middle. Shot entered the outside of the femur. Bullet remained fixed. Treated at Sulz until August 12th, then in the University Clinique, at Erlangen, till May 20th, 1872. After tedious inflammation, several small pieces of the bullet and twelve bone splinters were extracted at Erlangen. The leg is shortened 3½-inches. Hip and knee-joints completely ankylosed. Thigh bone very much thickened. Several cicatrices, extending down to the bones, cover the thigh and reach down to the knee joint. There is a fistulous opening on the outside of the thigh. Patient walks on crutches. Considerable improvement after six weeks of the bathing cure. Ankylosis of the joint not improved.

As a rule, as the above quoted cases prove, periostitis extending to the diaphysis and osteomyelitis of a suppurative character end in inflammation or suppuration of the hip-joint; I have, however, seen a case in which inflammation of the bone caused by a large gun-shot fracture at the junction of the middle and upper thigh, with splintering of the diaphysis lengthwise, and lodgment of the bullet which had been in situ for months, took the form of a plastic osteitis, and led to considerable enlargement of the head of the femur and expansion of the acetabulum, without any joint suppuration. I performed disarticulation of the thigh on a Danish soldier, who had been wounded on April 9th, 1848, in the first Schleswig war, towards the end of June of the same year, at Flensburg, for extensive splintering in the middle and upper third of the diaphysis, which threatened, through profuse inflammation and hectic fever, to kill the patient, who was a young and hitherto strong man. After I had cut through the articular capsule close to the edge of the acetabulum, the head of the femur would not protrude, and it required great exertion to force it out. The head of the femur was much enlarged, as through arthritis deformans (chronic rheumatic), and had an overhanging

margin from having been driven into the acetabulum (*My treatise on gun-shot fractures of the joints.* Berlin, 1868. *Table II., No. 6.* P. 20.

Traumatic Periarticular Coxitis.—It now remains for me to say a few words on traumatic periarticular coxitis, which is generally mentioned in elementary books on military surgery. It is understood that a gun-shot canal running close to the joint may lead to inflammation of the hip-joint, particularly if the joint is grazed by the shot, or even if the synovial bursa, which lies close under the iliacus and psoas muscles, and inwards from the ilio-femoral ligament, is destroyed. As the bursa iliaca frequently communicates with the joint, or is close to the very thin articular capsule in this situation, the injury must be almost identical with a joint injury. On this account I would rather not call both these injuries periarticular, but add them to the list of hip-joint injuries. The bursa iliaca covered by the thick iliacus and psoas muscles, and protected on that side by the overhanging of the crest of the ilium and the trochanter, is very seldom implicated unless the joint itself is wounded at the same time.

Gun-shot injury of soft parts around the hip-joint.—Injuries of the soft parts near the hip-joint require the greatest care, even when the joint remains quite intact, because the subsequent periarticular inflammation and suppuration ultimately lead to formation of cicatrices and to contraction of the ligaments, which impair the functions of the joint. S., second lieutenant in the Fusilier battalion of the 20th Infantry Regiment, was wounded in one of the skirmishes which were so numerous before the battle of Orleans, Nov. 20th, 1870. The Chassepot bullet, fired from a short distance, smashed the revolver hanging by his left side, and, driving in a large piece of the handle and case, entered the outside of the left thigh, close under the trochanter major, and then, probably having been diverted from its course, remained fixed under the skin at the back of the thigh, whence it was cut out. On admission of the wounded man to the Jesuit school at Pithiviers, we found a large irregular opening on the front of the thigh and close outside the femoral artery. The bleeding, which had been considerable, had stopped, and the entire groin was very much distended by extravasated blood. A large piece of the handle of the revolver was extracted. Our fear that the femoral artery might have been hit was not confirmed: the finger, having been introduced, passed behind the vessels of the thigh, very close to the under part of the hip-joint, but did not, however, arrive at the end of the gun-shot canal. Active movement of the hip-joint could be freely permitted, the joint was evidently uninjured. As we marched to Orleans not long after, I lost sight of the wounded man, and did not see him again until this summer at Berlin, when he was quite recovered. The wound had led to an extensive suppuration of the groin, and several

incisions must have been made, one of which brought to light a piece of the guard of the revolver, which had been driven deeply in between the adductor muscles. In the groin there was a cicatrix of considerable solidity, as large as a hand, which obviously extended close to the hip-joint. The hip-joint itself, in whose immediate neighbourhood the suppuration had subsided, was not implicated during the inflammatory process : the movements of the joint were perfectly easy and free, and the joint was in its normal position. The movements of the joint were, however, limited, evidently in consequence of the attachment of the cicatrix to the fibrous articular capsule, and to the contracted ligaments, and consequently extension and abduction of the thigh were impeded.

In the course of hip-joint inflammation a tendency to flexion of the wounded extremity develops itself as soon as the patient is left to himself, *i.e.*, when the immovable bandages are discontinued, and, almost without exception, there is rotation outwards. We may even notice this condition, very soon after the injury, in the slighter inflammations of the joint, but we may also easily overlook it, as in the cases of hip-joint injury we meet in civil practice, because the wounded man lying on his back readily hides it, as, in order to let the injured thigh rest on the bed, he raises the vertebral column and by pillows supports it in a curved position. As this seems to be the constant position in hip-joint injuries, spontaneous luxation on the outer surface of the ilium is seldom met with, and perhaps only when the outer edge of the acetabulum has been shattered.

Dislocation as a sequel of gun-shot wound of the hip-joint.—Hoff (*Circular No. 7*, p. 74) reports a case of recovery after spontaneous luxation from a furrow shot of the head of the femur, with breaking of the edge of the acetabulum. The head of the femur had become anchylosed to the dorsum ilii, and the extremity was shortened five inches. Berthold also (*Statistics of the Invalided Men from the 10th Corps, German Military Surgical Zeitschrift.* First year. Volume II., p. 521) examined two invalids (*Table I., Nos.* 9, 10) in whom the femur had been dislocated on to the outside of the ilium.

Without doubting the possibility of a spontaneous luxation on to the dorsum ilii after traumatic inflammation of the hip-joint, I noticed that in the case examined by Hoff, as also in the first of those examined by Berthold, the head of the femur and the acetabulum were fractured, and in course of suppuration many bone fragments had been extruded, so that the possibility of a spontaneous fracture of the neck of the femur with a giving way of the under fragments on to the ilium cannot be altogether excluded. Another spontaneous luxation after traumatic coxitis, which may be more easily explained, is that due to the prevailing inclination of the injured femur to flexion

and rotation outwards, producing luxation forwards and inwards, towards the obturator foramen. Table II., No. 2, shows a case dissected by Olt, in which a furrow shot of the head of the femur, leading to suppuration in the hip-joint, had produced this luxation. Table III., No. 23, represents a second noteworthy case, in which the entirely severed head of the femur with half the neck, lying close to the obturator foramen, was fortunately extracted by Welker. A colossal growth of callus growing out of the regio trochanterica of the femur, was discovered here, which covered the dislocated head of the femur, and rendered its extraction more difficult. It appears to me doubtful whether the complete separation of the neck of the femur did not take place through exfoliation, after the head of the femur had become dislocated into the obturator foramen, through suppuration within the joint, as no traces of shot could be found throughout the injured parts.

Ankylosis resulting from gun-shot injuries.—The constant ultimate result of curable hip-joint injuries, as of gun-shot wounds of other joints, is ankylosis. The out-growths about the joint are cartilaginous, and ultimately osseous, and quite perfect if the various structures of the joint have sustained no damage, and if spontaneous luxation has not taken place. I cannot, from my experience, decide whether it be possible for a simple capsule wound to heal with preservation of the power of movement. I do not, however, doubt that with capsule wounds of the hip-joint, as well as in similar shoulder and knee-joint injuries, traumatic synovitis may be avoided or so restricted that movement of the joint may be performed without considerable hindrance. If long continued suppuration follows a capsule wound a perfect ankylosis may with certainty be expected. Our entire efforts must be directed to favour this ankylosis by favourable position of the extremity, for experience proves that in ankylosis of the hip-joint the extension and the increasing mobility at the ilio-sacral joint in time replace in some measure the wasted hip-joint, and so a very good, useful limb may ultimately be obtained.

Fibrous ankylosis.—A fibrous ankylosis and subsequent preservation of a certain degree of mobility in the joint may be expected if, after gun-shot fractures of the hip-joint, fragments of the head or neck are driven out and if a favourable position of the limb is maintained for a long period.

Shortening of the limb.—If considerable pieces of the head or neck of the femur have reached exfoliation, a certain degree of shortening of the extremity cannot be avoided, but as we may always reckon on some bone reproduction, the shortening will never exceed some inches, supposing always that extension treatment has been employed until perfect recovery, and that nothing unfortunate has occurred

during the after treatment. Table I. gives us the most striking proofs (*Nos.* 2, 4, 5, 17, 22) that the functions of the extremity may be retained in a gratifying manner, even when considerable loss of bone has taken place, and one may always reckon that shortening to the extent of one inch may be equalised by sinking of the pelvis, and will not therefore be noticed (*Table I., No.* 2), and that shortening to the extent of two or more inches may be supplied by corresponding elevation of the sole. Particularly instructive in this respect is a case treated by Windscheid and seen by me (*Table I., No.* 17), in which, after extraction of the head of the femur (which was split into two parts) and of a piece of the neck of the femur, a shortening of scarcely one inch took place, and in which with a correspondingly high sole the patient was enabled to walk well. If one compares these gratifying results with the following eleven cases, in which life was indeed preserved, but in which recovery was not followed either by ankylosis (*Table I., Nos.* 1, 3, 6, 8, 9, 13, 14, 15) or by spontaneous luxation of the femur (*Table I., Nos.* 10, 11, 25), and which ended in perfect uselessness of the limb—a misfortune which might with certainty have been avoided—one must admit that there are good grounds for my complaint of imperfection in the treatment of gun-shot injuries.

Danger of gun-shot injuries of the hip-joint.—Gun-shot wounds of the hip-joint are without doubt the most dangerous of all joint wounds. They are more dangerous than wounds of the knee-joint, because the importance of the wound increases the nearer it is to the trunk; because they are more difficult to recognise, and are so frequently not discovered through want of proper care; and because immobilisation of the joint, which is the chief requisite for successful treatment of joint wounds, is more difficult to carry out than with any other joint. Add to this that the capsule of the hip-joint, in almost all its extent being closely surrounded by the strongest ligaments and by thick muscular layers, is far less elastic than the articular capsule of the knee-joint, and that an accumulation of wound secretions may occur in the disproportionately compressed joint which favours their absorption in the highest degree, and all the more so as the hidden position of the joint and the displaced muscular masses render their discharge impossible through the wound opening.

Frequency and danger of septicæmia.—For these reasons symptoms of septicæmia in hip-joint wounds appear much earlier than in gun-shot injuries of other joints, particularly of the knee-joint. I have seen in gun-shot injuries of the hip-joint, only thirty hours after the reception of a wound, a putrid infiltration of all the fleshy parts in the neighbourhood of the joint with traumatic emphysema, and after freely dilating the wound a cadaveric smell has clung to our hands as it would after an autopsy. A glance at Table II. will show that the

greater number of those wounded in the hip-joint die from septicæmia and pyæmia. Thus of thirty-nine wounded in whom the cause of death is given, thirty-four died from septicæmia or pyæmia, three of venous thrombosis and embolism in the lungs, one of peritonitis, and one of exhaustion from hæmorrhage. Of the seventeen who died of septicæmia death took place in twelve cases from the sixth to the twenty-fifth day, while of those who died of pyæmia death followed eleven times between the thirteenth and twenty-fifth day and seven times between the twenty-eighth and fifty-first day. Apart from those extensive shatterings which must be considered absolutely fatal the danger of hip-joint injuries increases very considerably in proportion to the size and complication of the wound. If one were to regard our tables as final, simple contusions of the hip-joint would be the most dangerous. Then the four noticeable cases (*Table II., Nos.* 21, 29, 56, 58) of crushing of the articular capsule and periostitis of the head of the femur, which were fatal through venous thrombosis and embolism of the lung or through septic pyæmia. These cases show of what immense importance the right determination of the direction of the shot canal must be, and how necessary it is to treat all gun-shot wounds with the greatest possible care; for it is principally confinement of matter within the unopened articular capsule which causes the danger, and if this be not allowed to become pent up the prognosis of simple injuries of the hip-joint may be considered favourable. Thus of thirteen hip-joint wounds in which the articular capsule was alone affected, or in which an important injury to the bone was not discovered (*Table I., Nos.* 1, 3, 5, 6, 8, 9, 10, 11, 15; *Table II., No.* 18; *Table III., Nos.* 8, 14, 15), only four were fatal. Far more unfavourable are the mortality returns of hip-joint wounds with proved bone injury, as out of seventy-five cases the tables only show eighteen recoveries against fifty-seven fatal cases. But here we also find that the danger is increased by powerful concussion of the joint, and diminished by the shot canals being thorough and complete. For out of eleven wounds of the acetabulum, most of them with shattering of the brim of the pelvis, which one may well say stand next in character to joint contusions, there has not occurred a single case of recovery, while of ten gun-shot fractures of the head of the femur there are three recoveries, and of twenty-nine gun-shot fractures of the neck of the femur, including the most severe smashing of the part, five were cured.

The mortality statistics of the last war give evidence that hip-joint injuries are not absolutely hopeless.

Mortality statistics of gun-shot wounds of the hip-joint, treated by conservative and by resection treatment in the Franco-German war, 1870 and 1871.

Gun-shot wounds of the hip-joint.	Total.	Cured.	Died.	Doubtful result.	Percentage of deaths.
Conservative treatment.	88	25	63	—	71·59
Treated by resection and extraction of the head of the femur ...	31	4	26	1	83·87
Total.	119	29	89	1	74·78

Tables I. and II. show us that out of eighty-eight conservatively treated hip-joint wounds there were twenty-five recoveries. If we now find that in not a few cases wounded joints are not recognised, and on that account are not treated as joint injuries, and that even patients with most severe wounds are subjected to distant transport, so we may reasonably hope that in future the mortality returns of such cases will present a more favourable aspect, with not only expectant but with really rational conservative treatment.

Importance of early diagnosis.—To my mind the same principles apply to the treatment of hip-joint wounds as those I laid down in January, 1868 (*Gun-shot wounds of the joints, &c.* P. 15-25). It cannot be sufficiently impressed on surgeons that far greater attention, care and trouble are necessary than in the treatment of injuries of other joints. Above all, we must not wait till the progress of the case is possibly too far advanced, but even at the risk of making mistakes, we must take active measures, and by most careful examination decide what course the joint wound will probably take, and what must be done to make this course as favourable as possible.

First of all, all the lighter hip-joint injuries in which it is impossible to determine the exact diagnosis directly after wounding, are to be separated for conservative treatment.

Simple capsule wounds.—To this category alone belong all simple capsule wounds, which have involved the articular capsule from the margin of the acetabulum downwards, to the trochanter major and minor, where it only loosely surrounds the head of the femur. It does not appear probable that the eighteen gun-shot injuries of the hip-joint which I have specified as capsule wounds, simply because

injury of the bone was not proved, may *only* have been such, but rather I consider it quite possible that wounds of the head and neck of the femur and breaking off of pieces of the acetabulum might have existed. However that may be, it must be acknowledged that not only such injuries as are found to be gun-shot wounds of the hip-joint should have conservative treatment, as, according to Table I., out of ten of these cases dealt with by conservative treatment nine were cured.

Importance of conservative treatment, even when bladder and rectum are implicated.—Conservative treatment should be employed in all injuries of the bony parts of the hip-joint, which could not at first be recognised as such, or were only thought to be slight bone injuries. The mortality returns of such cases undoubtedly assume a more unfavourable aspect; as out of seventy-five cases of this kind treated by conservative treatment only eighteen recoveries are registered. But, if we compare these results with the thirty-one resections of the head of the femur with only four recoveries, we may make the assertion that also in these bone injuries conservative treatment should have the preference. It ought not to be considered peculiar that I should also put in a claim for conservative treatment in wounds of the bladder or of the rectum, or of complicated injuries of both organs, as the table shows two recoveries of this kind out of four cases which occurred during the last war. Extra-peritoneal gun-shot injuries of the bladder and rectum must not be considered altogether as the most severe injuries, supposing they are carefully treated, and it is difficult to understand why the danger of hip-joint wounds should be so greatly increased by these complications.

Cases in which conservative treatment is not applicable.—According to my way of thinking conservative treatment should not be adopted either for intra or extra-capsular fractures of the neck of the femur if the continuity of the bone is quite destroyed.

As recovery from these wounds hardly ever occurs without suppuration in the joint, consolidation of the fracture must be looked upon as impossible, and necrosis of the head of the femur, at all events in intra-capsular gun-shot fracture, as unavoidable. The opportune performance of resection or extraction of the displaced head must, of course, under all circumstances be taken into consideration.

The tables show us four fractures of the neck of the femur, two intra and two extra-capsular (*Table I., Nos.* 17, 18 and 24; *Table III., No.* 23), which have ended successfully. In the first case, which was treated by Dr. Windscheid, at Düsseldorf, the head of the femur, which was crushed and split into two parts, was extracted between the sixth and eighth week, and recovery followed with a good amount of walking power. In the second case, operated upon by Dr. Weiker,

the necrosed head of the femur and half the neck were extracted six months after the wound and recovery followed. In contrast with these four cases are eight intra-capsular (*Table II.*, *Nos.* 7, 15, 28, 55 and 59; *Table III.*, *Nos.* 4, 10, 11, 12 and 27), and two extra-capsular fractures of the neck of the femur, which were fatal. In three cases the necrosed head of the femur was extracted, but at a time when symptoms of pyæmia or septicæmia had already appeared. If I reckon two late resections performed by me in 1866, in Bohemia, for gun-shot fracture of the neck of the femur and necrosis of the head (*Gun-shot injuries of the joints*, *Table I.*, p. 46, *Nos.* 2 and 3), we have twelve gun-shot fractures of the neck of the femur with perfect destruction of continuity, which were fatal. As the operation in all these cases was performed at a time when there was very little hope of saving the patient, it would certainly be more correct to count them among the unsuccessful cases of conservative treatment.

We must, therefore, consider that complete separation of the neck of the femur and splintering of the head and neck of that bone should be excluded from conservative treatment, and that resection or extraction of the head should be performed, either primarily before the expiration of the first twenty-four hours, or directly after the expiration of the infiltration period and before suppuration commences. I hold that when gun-shot fractures of the acetabulum cause accumulation of matter in the pelvic cavity, it is an urgent indication for resection of the head of the femur. Volkmann (*Collected Clinical Lectures*, *No.* 51, p. 297) rightly insists that after the purulent accumulations of spontaneous coxitis, which burst through the bottom of the acetabulum into the pelvis, it is possible for them to have been diagnosed from symptoms of iliac abscess, *i.e.*, from their more acute origin; immediate resection of the hip-joint should be performed, and as early as 1863, I performed a hip-joint resection on account of gun-shot fracture of the acetabulum and abscess of the pelvis on this principle (*Gun-shot fractures of the joints*, p. 16, *Table I.*, *No.* 1).

The mortality returns of hip-joint resections during the last war were not much more favourable than they were earlier. Our table teaches us that out of thirty-one cases there were but four recoveries and one doubtful result; during the American war, in the report made by Otis, out of sixty-three cases there were five recoveries; and in the Bohemian war, if I mistake not, out of six resections there were only two recoveries.

Statistics of hip-joint resections performed for gun-shot injuries.

Hip-joint Resections.	Primary.			Inter-mediate.			Second-ary.			Total			Issue Unknown
	Total	Recovered	Died	Total	Recovered	Died	Total	Recovered	Died	Total	Recovered	Died	
Before 1861.	7	1	6	3	—	3	2	—	2	12	1	11	—
During the American War.	32	2	30	22	2	20	9	1	8	63	5	58	—
During the Bohemian War.	—	—	—	—	—	—	6	2	4	6	2	4	—
From 1867-70.	1	1	—	1	—	1	2	2	—	4	3	1	—
During the Franco-German War.	1	—	1	14	—	14	16	4	12	31	4	26	1
Total	41	4	37	40	2	38	35	9	26	116	15	100	1
Per cent.		90.24			95·0			74·10			86·20		

Doubts as to statistics.—However, it is certainly not admissible to judge the value of hip-joint resection by these statistics. It is indeed quite clear that resection undertaken during the infiltration period or during actual infection, does not offer as favourable chances of recovery as disarticulation of the thigh. I think, however, I may assert that in the last war, with the exception of a case operated upon by Beck, not one single hip-joint resection was performed before the end of twenty-four hours. In future, military surgeons should endeavour to perform resection of the hip-joint at the same time as primary amputations, and never defer the operation beyond the first day; after that time they must wait for suppuration of the wound and decline of the fever.

The immediate shock of the operation is not greater than that after

resection of other large joints. In only two cases (*Table III., Nos.* 2 and 3) which on account of extensive shattering were not suitable for resection, was the shock of the operation very considerable, one because of the very large amount of bleeding from numerous perforating arteries and from branches of the gluteal artery, probably in consequence of venous thrombosis, another time through the painful extraction of several large bone splinters which had entered the soft parts in all directions. In the other cases the operation was performed easily and quickly by the long incision described by me in 1867. I should like to point out, as the advantages of this *modus operandi*, the preservation of all the muscles running over the joint in connection with the periosteum of the trochanters or of the diaphysis, of the greatly diminished hæmorrhage, because the incision into the joint passes over the upper part of the sciatic notch on to the middle of the trochanter, and between the fibres of the glutæi muscles, and so avoids the main arteries, and lastly, because of the great extent to which the joint is exposed, and thus rendered more accessible. The division of the ligamentum teres which was necessary in all hip-joint resections performed by me in the last war, was much more easily effected than in operations on the dead body.

Mode of performing resection of the hip-joint recommended by the author.—I introduced a rather long narrow knife from the outer side behind the acetabulum, and continued the incision from within outwards, while the upper part of the femur was strongly flexed and rotated inwards. In this position the powerful tense ligaments of the thigh may be divided without any difficulty.

If the head of the femur is shot off, I seize the upper fragment with forceps suitable for resection, or if this should be impossible, with the resection hook driven into the bone, and let the head of the femur be directed towards the position mentioned above, of flexion and rotation inwards. If the neck of the femur is shot off close to the head, on a level with the edge of the acetabulum, as in the case operated upon by Seutin, at the siege of Antwerp, where the extraction of the head was extremely difficult, then these instruments are not applicable, but one must either bore a bullet screw or the tirefond of Heine into the head, to obtain the necessary hold for removal of the head of the femur. In secondary resections the ligamentum teres is either entirely destroyed, or has become so brittle that one can twist it off, as Pagenstecher did. As far as the incision is concerned, I consider it important to make it according to a fixed method, and not to adapt it in all circumstances to the position of the shot openings. This rule may be departed from when the extraction of the necrosed head of the femur is in question, or if after opening of a large joint abscess, the parts of the bone which are to be removed have become freely

accessible. Thus Welker, in the already mentioned case, by a straight incision about four inches in length which ran outside the rectus muscle, removed the necrosed head of the femur, and Lücke (*Report of the Surgical University Clinics.* Bern. 1865-72. *Deutsch Zeitschrift für Chirurgie*, vol. ii.) made an anterior incision in a case of hip-joint resection, as a large abscess had to be opened, and the finger was immediately introduced into the joint.

Disadvantage of removing the trochanter major.—I do not think that it is always advantageous to take away the trochanter if it can be retained, as the wound is larger and the recovery of a useful joint is less certain. A displacement of the wound aperture caused by the trochanter major pushing forward after the operation is an evil which has been the inducement to always recommend removal of the trochanter; but this need not be feared with the long incision, if the patient is immediately treated with the extension apparatus. The position of the patient after resection and the after treatment give rise, even with the entire comfort of a civil hospital, to no little trouble, but after a great battle one often meets with insurmountable difficulties, and the evils caused thereby are as often the reason of failure in hip-joint resections as it is after conservative treatment. The appliances for dressing wounds which are at present available during the transport are not sufficient to render it possible to move a patient with resected hip-joint, and these operations cannot on this account be undertaken in the field ambulances on the battle-field. But also in the field hospitals, to which primary hip-joint resections must certainly be transferred, it not rarely happens that all is wanting that is really indispensable for the proper placing of the person operated on.

Difficulties of the after treatment in military surgery.—We can certainly, if bedsteads are wanting, lay the patient on a straw sack, if we prevent by extension the contraction of the muscles and secure discharge of the wound secretions by means of free drainage of the wound. To preserve a comfortable position for the patient, to prevent the occurrence of decubitus and to enable us to give proper attention to the wound, bedsteads and the best mattrasses are requisite. I used extension with weights, which I consider the best apparatus after hip-joint resection, in a case operated upon by me in 1872. In this case, in consequence of the suffering caused by the hip-joint extensive bed sores had occurred during the patient's recovery, and he remained during the whole time lying with his face downwards.

Advantage of long incision in resection in causing free discharge of pus.—Discharge of wound secretion is perfectly insured by making the long incision, because the wound is formed in the most dependent part, in consequence of the patient lying on his back. It is therefore recommended to place the wounded man with his pillow resting on a

cushion, the shape of a horse-shoe, so that in this position movement of the wound may be avoided, and the wound secretions be allowed to drain into a flat porcelain dish placed below and containing a little carbolic acid. After recovery from the wound, I have in two cases in the course of this year used the apparatus invented by Taylor, of New York, for coxitis, and allowed the patient to walk. This has the advantage that one may let the patient set his foot on the ground and walk without disturbing the formation of the new joint. When the joint is properly consolidated, and yielding of the femur is no longer to be feared, I employ electricity daily, both for the maintenance of passive movements and to assist in the recovery of muscular tone.

Subsequent experience must decide the real value of hip-joint resection in war. The splendid result which this operation sometimes gives us in apparently hopeless cases in civil practice (see *Record of the Second German Surgical Congress, Berliner Clin. Wochenschrift.* 1873. *No.* 25, p. 297) warrants the expectation that with careful watching of the indications and proper selection of the time at which the operation should be performed, better results than heretofore may be attained. Experience has already proved that it is not the gun-shot wounds, but the unfavourable circumstances under which the operation is so frequently performed in war, that so invariably occasion bad results. According to Otis' account (*Circular No.* 2, p. 117 ; *Circular* 3, p. 232 ; *Nos.* 638, 640, 641) in the course of the American war, *i.e.*, from 1867 -1870, four gun-shot wounds of the hip-joint occurred in the United States in which resection became necessary. Of these four resections three were successful ; one, moreover, in which the shaft of the femur had to be sawn through above the trochanter, had good power of walking. In both the other cases, resection being performed below the trochanter minor, recovery was followed by shortening to the extent of three-and-a-half and six inches respectively, and the patients walked on crutches.

Of these three cases, one (*No.* 640) was primary, and was resected the day after the wound ; both the others (*Nos.* 638, 641) were secondary, five and eight weeks after the injury. In the case which ended fatally, the operation was put off until the twenty-sixth day, on account of *delirium tremens* coming on directly after the injury, and death ensued twenty hours after the operation.

The fact that the greater number of hip-joint injuries cured by resection were after secondary operations does not warrant the conclusion that primary hip-joint resections are to be avoided ; it rather encourages the belief that operations performed as soon as possible after the injury promise the most favourable results. I do not agree with Beck's opinion (*Surgery of Gun-shot Wounds.* Freiburg. 1873, p. 598) that primary hip-joint resection presents greater difficulties

than secondary, and on that account is more injurious. A resection is all the more easily performed the less the anatomical relations of the joint and its surroundings are disturbed by swelling, infiltration, &c. And I can affirm that I have never performed a hip-joint resection so quickly and with so little injury as in both the cases shown on Table III., No. 4 and No. 6, which, in regard to their operative treatment, may be looked on as primary resections.

Treatment of more severe injuries of the hip-joint.—Finally, we come to the cases of destruction of the neck of the femur, with extension to the trochanter, and we find that the nine injuries of this nature described on our tables have all ended fatally, and the question may be entertained whether primary disarticulation of the thigh or resection ought here to have been performed.

Danger of amputation at the hip-joint.—The results of the American war, with its great numbers, have been sufficient for settlement of the question of disarticulation of the thigh. We must regard it as an operation which, at the best, ought to be excluded from military practice, and one that ought at the most to be thought of in the light of re-amputation. Indeed, neither the Bohemian war nor the war of 1870-71 show a successful case of disarticulation of the thigh. I myself during the Bohemian war only performed this operation as I related before, in quite hopeless cases, and since then I have decided not to perform it any more during the period of infiltration, or after pyæmic or septicæmic symptoms have appeared. Septicæmic and very feverish invalids bear the loss of blood extremely badly, so that the great shock to the system, combined with the unavoidable bleeding from the smaller vessels during the operation, weigh heavily in the balance against this procedure. But in those cases, also, in which, at this stage of the wound, the patient submitted to disarticulation has not sunk from exhaustion during the operation or directly after, the end is generally fatal, because part of the putrid infiltration remains in the muscles surrounding the hip-joint, and the sloughing serves to increase the septicæmia. This is the reason why, during the last war, I did not perform any disarticulations of the thigh, as in all the cases fit for it the proper moment had passed, and the operation would only have hastened the fatal result. As it is indubitable that by opportune amputation of the sloughing parts the septicæmic process may be interrupted and the patient saved, neither is it admissible to do away entirely with disarticulation of the thigh during the period of infiltration. I would therefore use, as I have done successfully in disarticulation of the upper arm, a large piece of skin as covering for the wound, and separate the muscles on the flexor side of the thigh, after previously ligaturing the femoral artery in its axis.

I am still quite convinced that disarticulation of the thigh ought not

to disappear from military surgery, and that if we do not regard all very severe gun-shot fractures of the hip-joint and of the thigh from the commencement as lost, so in all these cases primary disarticulation ought to be performed, if possible, in the course of the first twelve to twenty-four hours. In reference to this I can only repeat what I said in the year 1868, and what I again wish to impress upon the reader, *i.e.*, that the only primary disarticulations I performed during the war of Schleswig, of 1848, recovered, and that one of the patients operated upon is still alive. (*My Treatise on Gun-shot Wounds of the Joints.*)

Unfortunately in the great number of disarticulations made in the last war the account of the nature of the wound and the period at which the operation was performed are wanting; I may, however, assert my opinion that not one of those operations was made at the right time. The performance of primary disarticulation of the thigh does not, according to my experience, cause a greater shock than amputation in the upper part of the thigh. In civil practice we perform disarticulation of the thigh successfully, even on very weak and reduced patients; in war we operate without success on individuals who are in full possession of their strength, and it seems to me quite evident that the unfortunate results are caused by other reasons than by the severity of the operation itself. If the right moment for disarticulation in extensive gun-shot fractures of the hip-joint is neglected, I consider resection admissible as the only means of saving life, with the view of disarticulation being performed later, when the patient is in more favourable circumstances; for I hold it to be impossible that after removal of large pieces of the diaphyses a useful extremity can be obtained, and that the fortunate results of disarticulation at the hip-joint at a later period, which were done as re-amputations during the American war, amply justify this attempt.

Conservative treatment of hip-joint injuries.—It still remains to me to speak of the conservative treatment of hip-joint injuries, which I should like to see carried out. I have already prominently stated that this treatment should not be merely expectant as to how the wound may perhaps end, but that from the moment of injury the most active care should be exercised and persevered in until long after the healing of the wound.

Immobilisation.—The first and most important task is the immobilisation of the joint and the suitable position of the patient. Scarcely any surgeon can urge any objection to the correctness of this view since the treatment of joint diseases has arrived at its present position among us. The objection may well be raised that I frequently require something impracticable, according to the present mode of warfare. During and after a great battle it is especially important to

convey those who are severely wounded to the nearest field hospital. In the temporary ambulance it is often impossible to put on bandages that require much time, because all hands are wanted for others who stand in need of no less important assistance, *e.g.*, primary amputations. In most cases sending the wounded men to the field hospitals without such bandages is not less to be avoided. The hospitals are often not properly established until the result of the battle is known, and nothing can be done save to lay the wounded, often without any bandage, on straw or on the ground. As the field hospital, during and after a great battle, is very soon overcrowded, all push on to the second station, which, however, is always several miles distant; the wounded man himself longs to go nearer home, the conductors of the conveyance for the wounded press on to get away with their companions as far as possible from the battle-field, and thus it happens, and will always happen, that severe gun-shot wounds of the extremities are dragged from one station to another, and remain for days without suitable bandaging. To lessen this evil, for to prevent it entirely is impossible, it becomes of the greatest importance to bestow every care on the preparation of suitable encampment apparatus for gun-shot fractures of the lower extremities, so as to make it possible to transport the wounded to greater distances, if necessary, without very much injury. Again, one may be ordered from strategic motives to remove the wounded immediately from the battle-field, or to quit the field hospital as speedily as possible.

Inutility of the Geneva Convention.—One must not reply that since the settlement of the Geneva Convention such evils cannot occur, and that the red cross renders the field ambulances and the field hospitals neutral, and must render them safe from the enemy's fire. In 1867, at the International Congress at Paris, during the discussion of these questions, I expressed my opinion that it was a delusion to believe that this kind of stipulation could have a practical result, and already during the last war this opinion was confirmed. It certainly has not happened, either in the last or in the former wars, that ambulance and army hospitals on the battle-field have been put under fire *because* wounded men were inside them, but it has happened, and will at all times occur, that these places will be brought under fire, although they were the resting-places of the wounded. Important strategic plans cannot and must never be sacrificed out of mere consideration for the welfare of the wounded, and the General would act unjustifiably who hesitated to fire and to take an important hostile position because the red cross designated it as the encampment of the wounded.

Instances in which the wounded have been exposed to fire while under shelter of the Geneva cross.—Thus it happened, and it could not be prevented, that on August 16th, at Vionville, our accumulated

wounded had for hours to submit to a hostile cannonade, and that on August 18th a farm in Brand, where the wounded were quartered, had to be shot at without our having the means of rendering any assistance to the sufferers; that on September 2nd the same thing occurred in the neighbourhood of Sedan; and that on December 3rd, at the taking of Artenay, the wounded collected in this little town were exposed to our fire.

I have made these remarks, not only because it seemed right to me to endeavour to remove the reproaches made during the last war by those at a distance about the care of the wounded on the battle-field, and to keep the claims and expectations associated with the Geneva Convention within their proper limits, but also especially to direct the attention of the practitioner to the great importance of simpler and more adequate field apparatus for gun-shot wounds of the lower extremities.

But to return to the position and immediate immobilisation of gun-shot wounds of the hip joint, it is of decided importance for the welfare of the wounded to leave them in the nearest field hospital; the first immovable bandage should be applied on the battle-field, and so arranged that the probable, unavoidable further transport to the first station of the army hospital, and perhaps on the invalids' railway wagon, may be undertaken without great injury to the wound.

Plaster of Paris bandage.—A plaster of Paris bandage well put on, surrounding the pelvis and the entire extremity, would best answer these requirements. During a great battle I do not consider the use of plaster bandages suitable; they are troublesome, and require too much time and too many experienced hands, and if badly put on may cause the greatest danger. Besides, the plaster bandage does not allow one, even if apertures corresponding to the openings of the wound are provided, to overlook and examine the hip-joint on all sides, which is of the greatest importance for the further treatment of the injury.

Splints.—Flat hollow splints are most desirable for the first immovable bandage, passing round the back part of the pelvis and of the entire wounded extremity, and leaving the fore part of the hip-joint free.

Wire hose of Bonnet.—The wire hose of which Bonnet gives an account were much employed in our army in the wars of 1848, 1864, 1866, and 1870. They occupy too much space to be taken in sufficient numbers on to the battle-field for lower extremities, and they may give rise to wound infection through the padding being quickly polluted. I should prefer the flat hollow splints now in use in the Austrian field equipment, or the splints Merchie mentions, of course

furnished with a pelvic portion, and modelled according to the shape of the body; and could these be made during peace of various sizes, a sufficient number might, in consequence of their greater lightness and of their occupying less room, be taken on to the battle-field. It would yet be more important to find a material capable of being easily packed but not easily spoiled, and possessing the requisite firmness and flexibility, so as to be accurately fitted to the shape of the body without loss of time.

Zinc splints.—I consider it probable that the zinc tablets suggested by the Imperial Austrian Army Surgeon, Dr. Schön, would best answer these requirements. Improvement of military field apparatus must be the subject of continued study and deliberation, all the more as the practice of the civil hospitals has lately made gratifying progress in this respect. As our tables show that nine of the successful gun-shot wounds of the hip-joint (*Table I.*) and that twenty-three of the fatal cases (*Tables II. and III.*) had to submit to distant transport to the army or reserve hospitals without proper bandages, and that not a few of the latter arrived at their destination in a hopeless condition, the grave importance of this task is evident.

Importance of permanent weight extension.—Another equally important method of treatment for gun-shot wounds of the hip-joint, as well as for gun-shot fractures of the thigh, is the *permanent extension* by means of weights. For most recent hip-joint wounds it has in general a beneficial effect during the inflammatory period, and also during the entire treatment of gun-shot fractures of the hip-joint it may be considered a true panacea; in war it is all the more important as the requisite apparatus is arranged easily, with the simplest means and without loss of time, and can never do the wounded man any lasting injury.

Mode of applying extension apparatus.—A strip of diachylon, whose ends pass over the outer and inner sides of the leg, and made firm by a bandage, retains the cord to which a six to a ten pound weight is appended. On the field it is possible to prepare this most simple extension apparatus even when bedsteads are not at hand. A piece of stick at the foot of the straw sack is stuck in the ground, and through a hole in this the cord which should bear the weight passes. I have frequently hung the wounded man's bread bag, filled with stones, at the end of the diachylon sling. It does not make the hip-joint absolutely immovable, but with the addition of sandbags the inclination of the thigh to rotate outwards may be checked. One good effect of the extension apparatus is that the flexed position with outward rotation, which the limb always endeavours to take, is prevented, and also the joint is kept in a more favourable position. I have frequently used the extension apparatus for gun-shot fractures

of the hip-joint and lower half of the trochanter, and the severe pains caused by contraction of the muscles and friction of the fractured surfaces have thereby disappeared. During the inflammatory and suppuration periods extension removes the intra-articular pressure caused by the collection of exudation material within the joint, by the one-sided position of the head of the femur, and by the great muscular straining. Arnold found (*Anatomical Contributions to the Study of Gun-shot Wounds.* Heidelberg. 1873-4. P. 86), and I also from a number of similar observations can affirm, that inflammatory changes, and particularly cartilage and bone mischief in the joint, are far more considerable in those cases in which continuity in the neck of the femur and of the femur was not removed, although less than in complete gun-shot fractures of the neck of that bone.

I have found in two cases of secondary resection, which were made on account of complete separation of the neck of the femur by a shot, the joint surfaces perfectly smooth and not eroded, and the acetabulum in its right shape; while in gun-shot wounds of the acetabulum alone, and in furrow-shot wounds of the head of the femur, &c., I have seen considerable changes in the joint surfaces. But I do not, like Arnold, believe these changes are owing to the movements of the head of the femur in the acetabulum, but consider them due entirely to the enormous pressure of the joint surfaces against each other, which the contracting muscles produce, while in gun-shot fractures of the head and neck muscular contraction has no effect on the joint surface.

If the wound be healed or on the point of recovery, the extension by weights is the best means to overcome the tendency to flexion of the thigh, to remove or lessen the probable contraction, and to insure ankylosis of the joint by placing the extremity in a favourable position. For, as in gun-shot fractures complicated by displacement of fragments, perfect consolidation only occurs after months, and as ankylosis of the hip-joint also remains for a longer time fibrous, extension with heavier weights (ten to eighteen pounds) may then be used for removal of contraction and for improvement of position with the best results.

When the joint wound is perfectly healed, and when all is achieved by extension that is possible, then comes the question of letting the patient try to walk with crutches; if so, then I consider immobilisation of the joint with plaster-or paste bandages imperative, as the joint still remains painful and swollen, and fresh causes for inflammation and suppuration may appear even long after an apparently successful recovery.

Dilatation of the Wounds—Incisions into the Joint—Extraction of Splinters.—I have never been able to make up my mind to unconditional dilatations of all fresh wound apertures, merely for the sake of

finding out the existence or non-existence of a joint injury; I even consider, as I remarked in 1868, that all over active probing of the shot canal is objectionable. There is no longer any doubt that gun-shot wounds of the joints may recover without suppuration, and I consider probing the shot canal of all supposed capsule wounds, and particularly of all joint wounds, which one has decided to treat conservatively, as entirely unadvisable. The insertion of the finger and probe into the shot canal in many cases does not confirm the diagnosis, because the finger is too short to reach the joint, and the probe is caught by the muscles which surround the joint wound, and considerably impairs the chance of a favourable healing of the wound, because the shot canal is again irritated and exposed to the air, and fresh bleeding, as a rule, ensues.

Cases in which extraction of bullet is called for.—But if the bullet remaining in the wound is perceived in the neighbourhood of the joint, I consider extraction necessary; for in most cases a fresh incision, leading direct to the bullet, would then be preferable to extraction with crow-bill forceps through the opening of entrance of the shot. On the other hand, dilatation of wound openings, and examination with the finger and probe are admissible, and even necessary, as soon as it becomes a question of operation in undoubted bone injury of the joint, so as by examination to decide whether resection or disarticulation should have the preference.

Dilatation of gun-shot wounds.—Dilatation of gun-shot wound openings may further be necessary to let out a quantity of blood which is retained in the joint, because that is the only means of preventing the unavoidable extensive infiltration of the soft parts covering the joint, and the consequent putrid decomposition of the infiltration.

Removal of bone splinters.—When we find bone splinters in dilating gun-shot wounds, I deem it advisable to extract them if they lie quite loose in the wound, and more especially if they are likely to interfere with the shot canal or prevent the discharge of secretions from the wound. Repeated vigorous attempts to take bone splinters out of fresh gun-shot wounds, I believe to be altogether inadmissible. Every considerable incision made for this object only increases infiltration and the risk of infection, because afterwards venous thrombosis easily takes place in such cases. In all instances where extensive splintering is evident, I should give primary resection the preference.

Advantages of free incisions.—Incisions are of the greatest importance, although even now they are frequently neglected or not sufficiently early and freely employed, whether they consist of mere dilatations of the wound opening, or of new incisions, during the infiltration and suppuration period. In extensive septic infiltration with traumatic emphysema, in acute purulent effusion, incisions are, of

course, without any influence on the progress, as they cannot remove the infiltration. Wounded men with acute septicæmia die without exception. Collections of matter may be emptied with the most gratifying results; and in no case, whether fever be present or not, should we delay making an incision when fluctuation can be ascertained in the neighbourhood of the joint. Should a previously overlooked fracture of the joint be the result, I would immediately give up all idea of resection, and continue expectant treatment, because, to undertake resections at this stage of the wound would give little prospect of a successful issue. Far more sure of a good result are incisions made during the suppurative stage of coxitis, and the often long-delayed suppuration, caused by loosening of sequestra. If, in the first instance, there is extensive shattering and suppuration of the joint, I would wait for the decline of the fever, and the discharge of matter, before resorting to resection; and should there be any loose splinters, extraction of them will suffice. It follows, as a matter of course, that the remaining treatment of gun-shot wounds of the hip-joint must be the same as for all other joint and bone wounds.

Ice.—In Germany, in the treatment of recent joint wounds, we prefer the application of ice. French surgeons, who have studiously adhered to the treatment which Dupuytren advocated for gun-shot wounds and gun-shot injuries of the joints, usually place leeches close to the recent wound, and later on warm cataplasms.

Leeches and poultices.—This method of practice so little corresponds with our views that it can scarcely be accepted by us, although Table I. contains two successful cases (*Nos.* 1, 7) which were at first treated in this way.

Lister's antiseptic dressing.—It is difficult to determine the value of the antiseptic treatment according to Lister's method, as practised on the field of battle during the last war. The grand results of complicated fractures thus achieved in civil practice challenge us to treat gun-shot injuries in the same way. I also can affirm that I have seen the recovery of two undoubted gun-shot fractures of the knee-joint after the use of Lister's occlusion bandages, without any inflammation of the joint. In both cases the wound openings were treated with lint compresses, steeped in concentrated (?) carbolic acid solution, and over them plaster bandages were put. When we renewed the bandages after fourteen days the wounds were closed with adhesive scabs, which with the lint compresses formed one mass, and when after another fortnight the lint compresses could be removed, together with the scabs, the wounds were completely cicatrised. I do not, however, believe that all gun-shot injuries of the bones and joints are suitable for Lister's treatment, and we must make careful selection if we would not run into the danger of using it unsuccessfully. The

stipulations we must make are, the possibility of our being able to bandage carefully very soon after the reception of the wound, the instant immobilisation of the extremity, and the avoidance of transport. When the tissues are very much disorganised, or when immediately after the wound a spreading sanguineous infiltration occurs, Lister's treatment, however carefully applied, cannot prevent sloughing at the bottom of the wound. We must resort to daily and careful examination of the wound, and to well-timed incisions, or we shall, in neglecting these precautions, expect too much from the antiseptic treatment.

TABLE I.

GUN-SHOT INJURIES OF THE HIP-JOINT TREATED CONSERVATIVELY DURING THE GERMAN FRENCH WAR.

Observer and authority	Name of the wounded date and place of wounding.	Nature of the injury, symptoms, course and treatment of the wound	Remarks.
von Langenbeck. ...ecords of the ...ractions of Military Surg... Society in ...ns. Session 25th, 1871. ...an Military ...of France ...ber 1873, p... Dr. A. Chip... (*Deutsche ...ur.*) relates same case, ...ervation 58, ...1.	De Mermies, captn. 38 French Infantry Line Regiment, wounded December 2nd, 1870, at Artenay. Entry of the Ambulance of the Rue de Renavarre at Orleans several days later.	Shot through the left hip-joint and bladder. Entrance about 1½ inches under the superior anterior spine of the ilium, close outside the femoral artery. The bullet (a leaden one) opened the joint, passed under the thigh vessels in the pelvic cavity, perforated the bladder extraperitoneally, and went through the right side of the sciatic notch, where it remained fixed under the skin, and was cut out on the buttock. At first severe bleeding from the wound, and repeated discharges of blood from the urethra, but without pain, took place. No discharge of urine through the joint wound, which is emptied through the urethra spontaneously and without pain. Very severe pains and high fever. Later, December 15th, discharge of urine and matter from the aperture of entrance. The urine passed by the urethra contained much matter. By lying in a half-sitting position on his back, and resting on the thigh, and with bent knee, the femur is gently flexed at an angle of 80°, and the vertebral column in a state of lordosis. Femur strongly rotated outwards. Fore part of the joint much swollen and very painful if touched. Femoral artery pushed forward by the joint swelling, beats on the surface; bone crepitation unnoticeable near the joint. Every movement in the joint, or attempt to improve his position, prevented by the patient. In January, 1871, gradual decrease of suppuration. Urine begins to flow in the natural way. I repeatedly advised extension with weights, but they were refused by the patient.	Perfect cicatrisation of the wound on March 1st, 1871. Joint already ankylosed, but still swollen, and very sensitive to the touch. Patient very much lowered, and highly feverish on my last visit, March 8th, 1871.

No.	Observer and authority.	Name of the wounded, date and place of wounding.	Nature of the injury, symptoms, course and treatment of the wound.	Remarks.
2	B. von Langenbeck.	Conrad Kiepe, Fusilier in the 5th Thüringian Infantry Regiment, No. 94, 9th Company, from Eisenach, wounded, Jan. 6th, 1871, at La Fourche, treated in the hospital at Epernay (manufactory of Moët and Chandon).	Gun-shot fracture of the right hip-joint by a Chassepot bullet. Entrance close under tuberosity of the pubes on the right side, exit behind the trochanter major of the same side. Joint injury at first overlooked. I found indubitable fracture of the neck of the femur. Trochanter ponderous at the top. Extremity shortened 2⅞ inches. Point of the foot turned slightly outward. Joint much swollen. Femoral artery very much pushed forward and beating on the surface. At first he lay simply on his back; from the 11th March, 1871, he was treated with weight extension. Later with plaster bandage, in which the patient lay for eight weeks. I learnt from the practical surgeon, Dr. Ris, of Zürich, that the suppuration of the joint lasted till August, 1871. By repeated incisions, parts of the acetabulum and of the head and shaft of the femur were extracted. Recovery from the wound completed by October, 1871.	In the spring of 18 Kiepe came to Ber Examination in Clinical Hospital sh ed shortening of right thigh to the ex of four-fifths of an i which is equalised sinking of the pel Patient walks very w without limping even without a st Some amount of m ity in the hip-joint present. The defec mobility in the foot knee-joint was quite ed by the baths at W baden (Neubauer, R William Sanatori Wiesbaden, 1872, 19, where the woun man was entered ur the name of Kiepe).
3	B. von Langenbeck.	Friedr. Scharrer, 3rd Royal Bavarian Infantry Regiment, wounded December 2nd, 1871, sent to Darmstadt to the Princess Alice's Barracks.	Gun-shot injury of the left hip-joint, of the bladder and of the rectum. Entrance behind the left ridge of the sacrum. Exit close under the left side of Poupart's ligament, outside the tuberosity of the pubis. For four weeks there was discharge of urine through the wounds, a little emptied through the urethra. Urine at first bloody, and then mixed with fæces, coming out from both wound openings.	Perfect recovery the wounds, March 2 1871. Hip-joint al ankylosed.
4	B. von Langenbeck.	Heinr. Mühlbach, 108th Infantry Regiment, from Heilendorf Province Gottleuba, wounded Dec. 2, 1870, at Brie, sent to Homburg from the H., Crown Princess' Barracks. (Aulic Councillor Dr. Deetz.)	Gun-shot wound of the left hip-joint. Shot entered 1⅞ in h under the anterior superior spine of the ilium, almost between the trochanter and spine, on the left side. Exit near the ascending ramus of the ischium of the same side. From Brie sent to the Crown Princess' Barracks at Homburg. For the first eight days after the injury, patient walked about, complaining, however, of pain in the knee and hip-joints. Then severe pains in the hip-joint, followed with fever and much suppuration. Treatment by extension in the recumbent posture.	Wound quite hea March 23, 1871. Pa already walks very Length of extrem alike. Mobility in joint almost entirely served.
5	B. von Langenbeck.	Beischlag, subofficer of the Royal Bavarian 12th Inf. Regt., wounded Dec. 2nd, 1870.	Gun-shot wound of the left hip-joint. Entrance through the great sciatic notch on the left side. Exit two inches under the anterior superior spine of the same side.	Healing of the wo perfect in March, 1 Joint still swollen very sensitive if touc and slight mobility.
6	B. von Langenbeck.	Jung, from Grefrath, near Solingen, Westphalia, Ulan Regiment, No. 5.	Gun-shot wound of the right hip-joint. Entrance two inches under the pubic tubercle on the right side. Exit between the tuber ischii and the trochanter major of the same side.	Healing of the w perfected in March, 1 Thigh bent at almo right angle and perf ankylosed.

...ver and ...hority	Name of the wounded, date and place of wounding	Nature of the injury, symptoms, course and treatment of the wound	Remarks.
...n Langen-...k. (Dr. C. Brig-..., *Surgical Ob-...ations.* Paris, ...2. 8. P. 60.)	A. Darettelong, 27 years old, French 76th Line Regiment, wounded Aug. 18th, 1871, at Metz.	Gun-shot injury of the trochanter major and the hip-joint on the right side. Entrance through the right buttock and trochanter major. Bullet remained fixed under the spina anterior under the muscles which cover the joint. At the examination of the wound opening, made on Sept. 8th, the finger passed into a hole in the trochanter major. The bullet was about an inch below the spina anterior, and was removed. Warm cataplasms. Sept. 12th, abscess in the place where the bullet had been, later two other abscesses lower down; open drainage. Healing of the wound, Nov. 1st, 1870. Nov. 14th, patient walks, according to Dr. Brigham, who treated him in Nancy, without crutches, rather easily and with slight shortening.	I saw the wounded man March 13th, 1871, in the hospital at Nancy. Fore part of the hip-joint swollen and very sensitive, thigh flexed and adducted: mobility difficult. Rather severe suppuration, which without doubt comes from the joint. Probably the joint suppuration only appeared after Dr. Brigham had given the wounded man into other hands, and was caused by fissures which extended from the fractured trochanter into the joint.
von Langen-eck.	John Simon, 12th Bavarian Infantry Regiment, wounded Dec. 2nd, 1870.	Gun-shot wound of the left hip-joint. Entrance behind the left trochanter major. Exit close under Poupart's ligament 1½ inch from the tubercle of the pubis of the same side. Enormous swelling of the joint and of the entire thigh. Side position. Ice treatment.	Healing with ankylosis, the limb in a state of flexion and outward rotation. In this state removed to Darmstadt. Dr. Kuhler performed resection for improvement of the position. March 22nd, 1871, I saw the patient, cured. Slight shortening. Hip-joint still very sensitive.
Dr. Berthold, ...eral Surgeon ...he 10th Army ...ps. (*...rman Mili-...y Medical ...rnal.* 1872. ...521.)	Sæling, Fusilier in the 16th Infantry Regiment, 10th Army Corps, wounded Aug. 16th, 1870, at Mars la Tour.	Gun-shot injury of the right hip-joint. Entrance in the right buttock. The shot probably entered the joint and remained fixed in the neck of the femur. In the hospital list the case was described as bone contusion.	Healing perfect in March, 1871. Thigh perfectly ankylosed and the hip-joint in a half-bent position. Shortening of the bone 3½ inches. Walking only possible on crutches.
r. Berthold.	Neumann, Musketeer, 91st Infantry Regiment, 10th Army Corps, wounded Aug. 10th, 1870, at Mars.	Gun-shot fracture of the left hip-joint. Entrance in front. Exit through the left buttock. Cavity of acetabulum and head of femur partly fractured, tedious suppuration, with expulsion of many large and small bone fragments. Repeatedly advised resection—was refused.	In April, 1872, still suppuration from fistulous openings. Thigh luxated upwards and backwards, and immovable. Knee adducted and slightly rotated inwardly. 2½ inches of shortening. General health not satisfactory.
r. Berthold.	Hoppmann, Fusilier Royal Prussian 16th Infantry Regiment, 10th Army Corps, wounded August 16th, 1871, at Mars la Tour	Gun-shot wounding of the right hip-joint. Bullet fixed. In the hospital list described as bone contusion.	In March, 1872, perfectly cured. Femur dislocated outside the haunch bone, quite immovable, flexed, rotated outwards, and shortened by several inches. Patient can only walk on two crutches.

No.	Observer and authority.	Name of the wounded, date and place of wounding	Nature of the injury, symptoms, course and treatment of the wound.	Remarks
12	Dr. Schinzinger, Professor at Freiburg. By correspondence also in the Reserve Hospital Schwezingen, Freiburg, 1873 8.	Renèe Rousseau, wounded August 18th, 1870, at St. Marie aux Chênes. Entered the Reserve Hospital, Schwezingen, Aug. 27th, 1870.	Gun-shot fracture of the right hip-joint. Entrance in front 3½ inches under and rather behind the right superior anterior spine. Bullet remained fixed. Thigh bent inwardly, and fixed in strong incurvation. Pressure near the inguinal region, and attempts to move cause the severest pains. Highly feveri-h. Temp. 40°. August 29th, on the opening of an abscess, lying in the gluteal space, discharge of nearly a pint and a half of matter. Continual copious suppuration. September 14th, extraction of bone splinters from the shot canal. September 16th, extraction of a part of the bullet, and in the evening of the remainder of the bullet, with the vulsellum forceps. September 26th three small pieces of bone extracted from near the hip-joint. October 25th, decrease of the suppuration. Bone bent at the hip and knee joints. Gentle attempts at extension.	February 10th, 1 cured and sent home
13	Dr. Becker, Chief Surgeon of Royal Prussian Brigade. (Unprinted account of the revision of the invalids.)	Rich. Flügel, Royal Prussian Reserve, Lieutenant 47th Regiment, wounded Aug. 6th, 1870, near Worth.	Gun-shot fracture of right hip-joint, besides two graze wounds. Entrance about 2 inches above the trochanter major on the right side. The bullet passing close by the shaft of the femur, penetrated the joint, and was taken out twenty days after the wounding Nov. 25th, 1871, patient still kept his bed. Upper half of the thigh very much swollen. Leg very much wasted. Right trochanter is 1⅞ inch further from the symphysis than the left. Several pieces of bone belonging to the acetabulum are still extracted from the shot canal.	February 8th, recovery was estab with osseous ankyl the hip-joint, and in ant expansion of the part of the joint. shortened 1⅝ inch. vis corresponds wit deformity, limb s bent, and the knee hip-joint strongly r outwardly. Pat walks with crutche
14	Dr. König, Professor at Rostock. (Report of the Second Sitting of the German Surgical Congress. Berlin, 1873. P. 19.)	Heimann, 105th Saxony Regiment, treated at the Barracks Hospital of the Berlin Relief Society.	Gun-shot fracture of the hip-joint. Bullet fixed. To empty the retained pus, König made a dilatation of the wound opening, whereby a hole was discovered in the neck of the femur, and several pieces of bone, amongst them parts of the head of the femur, were extracted. The bullet lay on the other side in the soft parts of the joint, and was extracted.	Recovery with losis.
15	Dr. Doutrelepont, Professor at Bonn.	Von der Borgk, Prussian Lieutenant, wounded August 16th, at Mars la Tour.	Gun-shot injury of the hip-joint. Entrance behind the trochanter major. Direction of the shot canal towards the hip-joint. Bullet fixed. September 17th, patient sent from Mars la Tour, where I had repeatedly seen him. Wound healed.	Upper part of the and of the hip-joint losed in an ext position. No shor Spina anter. super. 1½-in. After corre ing with Professo patient returned service in Cologne
16	Dr. Goltdammer. (Account of work done at the Reserve Hospital of the Gard-Ulan Barracks at Moabit. *Berlin Clinical Weekly Jour.*		Graze-shot of the trochanter major. Severe pains in the hip-joint on pressure and on passive movements. Incapability of raising the leg. Thigh abducted and rotated outwards. The gluteal fold on the affected side much depressed (flattened).	Cure of shot effected in a few w For nearly five m the patient was u to stand on his leg (This case mus tainly be conside primary hip-joint i

Observer and authority.	Name of the wounded, date and place of wounding.	Nature of the injury, symptoms, course and treatment of the wound.	Remarks.
...f. 1871. No. 2.)			fissures into the joint extending from the wounded trochanter major.)
Dr. Windscheid, of Dusseldorf. (Record of the Second German Congress. Berlin, 1873. P. 70.)	A mountaineer living at Essen, wounded Aug. 18th, 1870, at Gravelotte.	Gun-shot fracture of the hip-joint. Entrance behind. The wounded man was sent from Gravelotte to Courcelles, from there to Mainz, and then by ship to hospital at Dusseldorf, where he arrived without bandage and with a bedsore as large as the hand. Signs of fracture of the neck of the femur. Joint swollen. The patient remained in bed in the recumbent posture from five to six months. Between the sixth and eighth weeks the head of the femur was split in two and a piece of the shaft was extracted.	Perfect recovery with about an inch and a half of shortening. A high sole hides the shortening satisfactorily, so that the patient walks very well. I saw him in March, 1871, at Dusseldorf.
H. Fischer, Prof. at Breslau. (*Army Surgical Experiences*, First part. Erlangen, 1872-4. P. 173. Obs. 254.)	L. v. Renz, wounded Aug. 6th, 1870, at Spichern.	Extra capsular gun-shot fracture of the shaft of the left femur. Entrance in front close under the trochanter major. Bullet lodged. Patient was first seen by F., at the end of September. Cure almost effected. Leg shortened with rotation outwards. Upper part of the thigh much swollen. The wound broke out again the end of November. Dec. 10th, extraction of the bullet from a cleft in the neck of the femur, which proved an extra-capsular fracture. Fragments of the shaft still slightly movable by strong rotation. Treated with extension.	Cure effected March, 1871. Movement in the hip-joint very constrained. Point of the foot rotated outwards. Shortening to the extent of one and a half inches.
Socin, Professor at Basle. (*Experiences of War Surgery*. Leipsic, 1872-4. P. 135, No. 9, also p. 51, 166. Table II.)	J. C. Schaefer, 52nd Regiment, wounded August 6th, 1870, at Worth.	Gun-shot fracture of the shaft of the femur and of the trochanter. Entrance behind the trochanter major. Exit two inches below Poupart's ligament. Plaster bandage. Free suppuration and favourable progress. Then after transport to another hospital on the 94th day, arterial bleeding, which made the ligature of the femoral artery necessary. This also ended favourably.	Recovery of the wounds. Patient died four weeks later of erysipelas. Section showed fracture of the neck and of the trochanter, with lesions in the joint. The fracture consolidated. Hip-joint fibrously ankylosed.
Socin. (Record of the Second German Surgical Congress.)	Unknown French Soldier.	Gun-shot fracture of the hip-joint.	Socin saw the case recovered. Patient carried the loosened splinters of the head of the femur about him.
MacCormac, Surgeon to St. Thomas's Hospital, London. (A. A. O. S. 99.)			It is only mentioned that of three penetrating gun-shot wounds of the hip joint, one was cured.
Volkmann, Prof. at Halle. (*Collection of Clinical Reports*, No. 51. Leipsic, 1873. P. 381.)	Name unknown, wounded at Toul.	Intra-capsular gun-shot fracture of the neck of the femur. Not known.	After exfoliation of some pieces of bone recovery followed with comparatively little shortening.

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23	Dr. B. Beck, (*Surgery of Gun-shot Injuries, &c.* Freiburg. Br., 1873. 8. P. 600.)	W., wounded November 30th, 1870.	Gun shot fracture of the right hip-joint. After free suppuration and extraction of several splinters of bone, recovery was the result, with complete ankylosis.	When the patient w invalided in Decemb 1871, there were sever fistulous canals, out which matter and syn via-like fluid flowe Thigh still swollen General health good.
24	Dr. Neubauer, Surgeon-in-Chief	Bernau, sub-officer 7 Westph. Inf. Regt., No. 56, wounded Sept. 27th, 1870, before Metz, at a sally of the French.	Gun-shot wound of the left hip-joint. Entrance through the left sciatic notch. Exit above the trochanter major. Patient instantly fell to the ground, foot outwardly bent. The examination which took place twelve hours after the wound showed extensive shattering of the hip-joint. Proposed exarticulation of the femur, refused by the patient. Extraction of several large bone splinters. Plaster bandages; later on treatment by the inclined plane.	Patient was, in Sept 1873, in the Garris Hospital at Wiesbaden Left extremity shortene between 2½ and 3 inche Head of the femur lu ated on to the ilium and here quite movabl The neighbourhood the trochanter mu swollen by masses callus formation. Tw fistulous openings le close up to the join General health satisfa tory. Walking good.
25	Dr. Neubauer. (Royal Wilhelms Sanatorium at Wiesbaden, in June, 1872. *German Military Surgical Journal.* 1873. 4th copy, p. 20.)	Reinhold Behrens, Lance Corporal, Magdeburg Hussar Regiment, No. 10, wounded August 30, 1870. Remained at Wiesbaden till recovery, 1872.	Gun-shot wound of the right hip-joint.	After a very long a severe illness, and af splinters of bone h been di-charged, the p tient, in 1872, could w again by the help of stick. Complete an losis of the hip-joint, ol quity of the pelvis, cur ture of the vertebral lumn and visible leng ening of the right tremity remained. large fistulous swelli 1½ inches under Poupa ligament, through wh the probe passed 3 inc deep without touching bones. Was almost tirely cured at Wiesbad

TABLE II.

GUN-SHOT INJURIES OF THE HIP-JOINT WHICH WERE UNDER CONSERVATIVE TREATMENT AND WHICH ENDED FATALLY DURING THE GERMAN-FRENCH WAR.

No.	Name of Surgeon. Authority.	Name of the wounded man. Date of injury.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
1	Dr. Ott. (*Army Surgeon's Contribution to the Ludwigsburg Reserve Hospital.*	Noak, Fusilier in the Westphalian Infantry Regiment, wounded Aug. 6th, 1870. En-	Three-fold gun-shot fracture of the upper part of the left thigh, close under the trochanter major, with opening of hip-joint. Bullet fixed. Graze shot of the left upper arm. Wound in the soft part of the right	Disarticulation of the thigh refused. Encased in wire hose.	Death on the 48th from septicæmia. I hip-joint suppurati Joint communicated w the suppuration at upper part of the thi

Name of Surgeon. Authority.	Name of the wounded man. Date of injury.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
ttgart. 1871. P. 51.)	tered Aug. 22.	thigh. Hip-joint injury not recognisable. Much displacement of the fragments of the thigh bone. Much suppuration.		From 20 to 30 pieces of lead, from the size of a groschen to that of a grain of sand, partly embedded in the cavity of the joint and in the acetabulum, and partly free in the abscess cavity.
. Ott. (The ne authority. ge 53.)	Liere, Royal Prussian Grenadier, wounded August 18th, 1870, at Gravelotte. Admitted August 27th, 1870.	Gun-shot wound of the right hip-joint. Grazing shot of the head of the femur. Aperture of entrance in front beneath the right Poupart's ligament. Bullet remained lodged outside the right femoral artery. Through the wound splinters of bone and gun-shot injury could be distinguished in the head of the femur. Suppuration in the depths of the wound.		Died September 4th, 1870, of septicæmia. Head of the joint luxated anteriorly and rather depressed. Bones rough. Graze shot injury on the edge of the head of the femur. Pus in the abdominal cavity. Bullet not found.
H. Fischer, fessor at elan (*Army gical Experiences*. 1st t. Erlangen, 72. 4. P. 34. Obs. 6.)	Daniel Henkel, 3rd Brandenburg Infantry Regiment, No 64, wounded Aug 18th, 1870, at Gravelotte. Entered at Neunkirchen Aug. 20th.	Gun-shot wound of the right hip-joint. Entry somewhat to the right of the symphysis pubis, the shot-canal running downwards and to the right side. Bullet remained fixed. Pressure on the fossa ovalis caused the discharge of a quantity of matter. The patient could stand and was able to walk several steps.	September 3rd the bullet was felt about 2½ inches below the anter. super. spine, and extracted by an incision from a cavity over the sartorius. Sep. 6th. — Pains in the knee joint. Coxitis in its first stage. Extension. Incisions. Sep. 19th, extension changed for simple fixing of the joint.	Death, October 9, 1870, from peritonitis. Diffuse peritonitis and purulent effusion in the pelvis. Fracture of the edge of the acetabulum. A continuation of the fracture of the os pubis. Bottom of the acetabulum was perforated by inflammatory mischief.
H. Fischer. A. A. O. ge 109). Obs. 5.)	H. Niemeyer, 74th Regiment, wounded Aug. 6th, 1870, at Spicheren Entered the Ziehwald Hospital Aug. 15th.	Gun-shot fracture of the right hip-joint. Entered in the right inguinal fold. Bullet remained fixed. Patient had pains near the hip-joint, but moved, however, the leg. August 14th, a piece of the bullet and waist-band buckle extracted from the shot canal. Profuse unwholesome suppuration. Delirium, high fever, hectic.		Died August 26, 1870. A fragment of the bullet, which had divided, had grazed the head of the femur, and remained stationary on the os ilium. Two losses of substance in the head of the femur. Suppuration in the joint.
H. Fischer. A. A. O. S. age 200. Obs. 327.)	Emmerich, 4 Magdeb. Infantry Regiment, No. 67, wounded Aug. 18th, 1870. Entered at Ot-	Gun-shot wound of the left hip-joint. Entered the left buttock 1¾ inches from the anus. The finger could pass along the shot canal, which went in the direction of the joint. Bullet remained fixed. After the wound, E. was able to stand on		Died September 3rd. Acute septicæmia. Gangrenous inflammation under the muscles of the buttock. Back part of the edge of the acetabulum split in two. Bul-

No.	Name of Surgeon. Authority.	Name of the wounded man. Date of injury.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
		weiler August 26th, 1870.	both legs, and to run. Aug. 20th, joint injury diagnosed as probable. August 26th, severe pains and restlessness. September 3rd, profuse bleeding arrested by pressure. Patient walked, September 3rd, as far as another bed. Several hours later died from syncope (acute septicæmia).		let fixed in the two fr ments of the div head of the femur. H joint very little chang Bleeding arose from gluteal artery.
6	L. Rupprecht, Royal Bavarian Chief Surgeon. (*Army Surgical Experiences from the War*, 1870-71. Würzburg, 1871.)	Officer, name unknown.	Gun-shot fracture of the right hip-joint. Entrance of a Chassepot bullet in the middle of the right inguinal region, outside the femoral vessels, close under Poupart's ligament. Bullet remained fixed, and was cut out of the trochanter major, where splinters of the bone were felt. Movement in the hip-joint free and slightly painful. On the 7th day, severe pains in the joint. On the 9th day, discharge of synovia, with matter. Continual fever. Delirium. After three weeks, rigors.		Died on the 33rd after receipt of inj of pyæmia. A piec the horizontal ramu the pubis was shatte and forced into the teal muscles. It here formed a large cess. Upper edge the acetabulum brok Suppurative hip-joint flammation and osteo elitis.
7	A. Schinzinger, Professor at Freiburg. Schwezingen Reserve Hospital.	Adolph Hiedel, wounded Aug. 6th. Entered August 10th, 1870.	Gun-shot injury of the right hip-joint. Entered behind the right trochanter major. Bullet remained fixed. Thigh much rotated outwards. Joint injury not known.		Died September 1870, of pyæmia. H joint suppurating. H of the femur necros Behind which was smaller half of the bul of which the larger lay about 1½ inches u the anterior supe spine of the haunch b
8	The same. (A. A. O. Page 20.)	Eduard Comte, from Villito. French 73 Infantry Regiment, wounded Aug. 18th at Gravelotte.	Gun-shot fracture of the left acetabulum. Entered the left buttock. Bullet remained fixed. On his entrance into the hospital, large swelling of the entire left leg from the foot to the hip-joint (acute purulent infiltration). Diagnosis not possible.	From different incisions, a little purulent fluid was discharged. Here and there quick progressive gangrene of the cutis. High continual fever (tem. over 40° C.) Dry tongue; delirious.	Died September 2 1870. Sloughing canal running thro the upper and poste margin of the ace ulum, which was brok Shaft of femur surroun by ichor, uninjured. canal passes behind rectum. Bullet was depression in the bod the second sacral verte Inflammation of the toneum. Strong slo ing of the entire th No thrombosis in vessels. No abscess the lungs.
9	The same. (A. A. O. Page 69.)	Maderit Beziers, wounded August 6th. Entered August 10th, 1870.	Gun-shot fracture of the left acetabulum. Entered on the left thigh, a hand's breadth beneath the trochanter major. Bullet remained fixed. Injury of the joint not known. August 28th, opening of the wound recovered. Patient complained of neuralgic pains in the		Died September 1870, of pyæmia. let went through upper and under pa the acetabulum, shat ing the os ischii an pubis, and remained ed, much changed

Name of Surgeon. Authority.	Name of the wounded man. Date of injury.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
		sciatic nerve. August 30th, diarrhœa, shiverings, pleuro-pneumonia of the left side.		shape in the left psoas muscle above the third lumbar vertebra. Peritonitis in the left half of the pelvis, pleuritis on the left side, pleuropneumonia on the right.
Th. Billroth, rofessor at enna. (*Sur- allberichten from e Army Hos- tals.* Berlin, 872. S. Page 27.)	Sergi Ben Henni, French- man, 1st Rifle Regiment, wounded Aug. 4th, 1870.	Gun-shot wound of the ri ht hip- joint. Shot entered behind the pelvis. Bullet remained fixed.	Aug. 12th, bullet cut out of the right side of the os sacrum.	Died August 19th, of pyæmia. Hip-joint opened behind. The edge of the acetabulum grazed.
The same. (A. A. O.)	Jean Galles, Frenchman, 30th Infantry Regiment, wounded Aug. 4th, 1870.	Gun-shot wound of the right hip- joint. Shot entered behind and on the right. Bullet fixed.	Aug. 8th, bullet cut out at the back of the aceta bulum, which was shattered.	Died August 17th, of pyæmia.
The same. (A. A. O. Page 228, No. 5.)	Linder, Lieu tenant, Royal Prussian 58th Infantry Regi- ment.	Shot through left trochanter to the perineum. Bullet remained fixed.	Aug. 11th, extraction of splinters.	Died August 16th, of septicæmia. B. des- cribes this case on page 238 as hip-joint injury.
A. Socin, Professor at le. (*Arm rgical Ex- riences*, 1870- 71. Leipzig, 1872. S. Page 198.)	Claude Marie Drivet, French Army, wound ed August 6th, 1870.	Gun-shot fracture of the right tro- chanter major, with opening of the joint capsule. Entered in front to the right of the trochanter; went out behind. Trochanter shattered. Fourteen days without reaction, then suddenly severe pains, and be- came very feverish. Upper thigh much bent. Free suppuration.	Dilatation of the wounds.	Died Aug. 28th, 1870, of pyæmia. Trochanter split in two. Joint cap- sule opened behind. En- tire joint filled with slough. Cartilage affect- ed.
The same. (A. A. O.)	Augustin Cavailles, French soldier, wound ed Aug 6th, 1870.	Gun-shot fracture of the left hip- joint with perforation of the rectum. Bullet entered over Poupart's ligament outside the thigh vessels, shattered the head of the femur, went through the acetabulum into the pelvic cavity and out through the os sacrum.		Died four days after his entrance to the hospital, on the 51st day after wounding, of septicæmic hip-joint suppuration, head of femur shattered. On the left side of the rectum, a cavity filled with excrement, matter and bone fragments. Rec- tum opened at the back.
Dr. C. Kirch- ner, Royal Prussian Chief Surgeon. (*Re- port of the Royal Prussian Field Hospital in the Place at Versailles*, Erlangen,	Name not mentioned (Loch holz n. Fischer), wounded Oct. 21st, 1870, before Paris.	Gun-shot fracture of the left hip- joint. Entered to the left between the anteror spine and the trochanter major. Bullet fixed. Foot rotated outwards. Passive movements pain- ful; active movements impaired. Upper thigh strongly infiltrated. Spontaneous pains very slight. Bone splinters felt in the wound. Suppuration in the beginning small,	Side position. Inci- sions to en- able the matter to dis- charge.	Died November 24th, 1870, of pyæmia. Bullet in entering smashed the spina anter. super., then opened the hip-joint and shattered the shaft of the femur causing separation of the head of the bone. Joint slughing. Lig. teres discoloured. Below

No.	Name of Surgeon. Authority.	Name of the wounded man. Date of injuries.	Nature of wound. Symptoms. Progress of the wound.	Treatment	Day of Death. Remarks.
	1872. Case 126).		then larger. In the third week rigors.		the shattering exten the upper third of femur. Bullet, backed out of shape, was o back surface of the fe The femoral vessels f Old caseous deposit the apex of the right l Fresh purulent dep in the lower part of right lung. Splenic enlarged.
16	The same. (A. A. O. Case 127.) Fischer. (A. A. O. No. 38.)	Name unknown (Kreischern. Fischer), wounded Nov. 20th, 1870, before Paris.	Gun-shot fracture of the right thigh below the trochanter major with opening of the joint. Entered close under the trochanter major in the direction of the pelvis, and considerable destruction of the bone. Bullet fixed. Shortening of the thigh. November 24th, emphysema of the thigh, very feverish, gangrene of the leg, delirious.	Pott's side position. November 22. Oblique plane.	Died November 2 1870, of septicæ Upper part of the t much swollen. U part of the thigh cov with livid blist Femur broken into f ments about thr quarters of an inch b the trochanter an rounded by slou Then the shot-c passes upwards and wards, opening the j on the front and in side. Synovial m brane injected a loosened. On the c lage covering the l there lay a small pie lead. Several fragm of the bullet were in adductor muscles. larger one in a her protrusion. No thr bosis in the ves Serious suppuration the knee-joint. Inte organs free.
17	The same. (A. A. O. Page 54. Case 28. Tab. II. Fig. II.) Fischer. (A. A. O. Page 68.)	Name unknown, wounded January 19th, 1870, before Paris.	Gun-shot fracture of the left hip-joint. Entered under the middle of Poupart's ligament. Bullet fixed. At first thought to be a flesh wound of the thigh. Very sensitive, and by the lightest touch very painful. Fracture (supposed) of the ram. horizontalis, with injury of the crural nerve. On the 16th day rigors, which were repeated.	Side position and extension could not be borne, then double inclinedplane, which, on account of the severe pains, was again changed for extension.	Died February 2 1871, of pyæmia. F part of the acetabul broken off. Head of femur rather shatter without destruction the continuity. Cha pot bullet, out of sha remained fixed in upper side of the acet ulum. Joint purule Cartilages almost tirely destroyed. In ileo-psoas muscles p ulent infiltration.
18	The same. (A. A. O. Page 54. Case 29.)	Name not given, wounded October 21st, 1870, at	Gun-shot fracture of the left hip-joint. Second shot in the right buttock. Bullet fixed. Wound foul. Fever. November 9th, rigors.		Died November 11 1870, of pyæmia. Bu entered the joint beh the shaft of the fem

Name of Surgeon. Authority	Name of the wounded man. Date of injury.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
	Orleans. Entered at Versailles October 29th, 1870.			and remained there. Femur considerably shattered. Pleuritic and pulmonary metastasis. Large abscess in the right side of the chest.
Dr. G. Fischer. (*Dorf Toury und Schloss Versailles*. Leipzig, 1872. Page 75-78. No. 39.)	Name not given, wounded January 9th, 1871.	Gun-shot fracture of the left trochanter major. At first thought to be a flesh wound, but discovered in eight days. Much bleeding from the buttock, stopped by compression. Sloughing, shivering.	Position on the healthy side. Incisions in the swollen and sloughing buttock and drainage.	Died January 29th, 1871, of pyæmia. Hip-joint opened and sloughing. Arterial injury not proved.
Dr. Becher, Royal Prussian Chief Surgeon. (*German Military Surgical Journal*. First year, 1872. Page 478.)	Name unknown.	Shot wound in the hip-joint. Entered in the groin. Bullet fixed. Patient could walk for some time, therefore joint injury was not supposed. Then severe coxitis and considerable suppuration. Then severe bleeding. Septicæmia.		Day of death not mentioned. Furrow shot of the neck of the femur. The bullet, pressed flat, was in the joint between the head of the femur and the acetabulum without injury to the joint surface being noticed. Joint suppurating.
B. von Langenbeck. (Military Surgical Society at Orleans. *German Military Med. Journal*, for the year 1872. P. 476.)	Von Poser, Lieutenant Royal Prussian 36th Infantry Regiment, wounded, Dec. 3rd, 1870, before Orleans. Field Hospital, Artenay.	Contusion of right hip-joint. Entered in front, about 1¼ in. below Poupart's ligament, outside the femoral plexus. Bullet remained fixed. At first there were no appearances of injury to the joint. Then pain in the joint; severe neuralgic pains near the sciatic-nerve led us to suppose that the bullet pressed on the nerves. Jan. 5th, 1871, very feverish rigors. Patient exhausted through very severe pains near the sciatic-nerve. Groin distended and painful if compressed. Thigh is flexed at an angle of 45° and rotated outwards. Active movements impossible, passive movements prevented by muscular straining. Much suppuration from the narrow wound opening. On Jan. 5th and on the following days the rigors recurred.	Jan. 5th, dilatation of the wound opening was made both above and below, with strong venous (pyæmic) bleeding. The bullet was extracted from the inner surface of the neck of the femur above the trochanter minor; it was flattened and its concavity corresponded with the part of the neck of the femur against which it had impinged. Joint capsule uninjured.	Died Jan. 12th, 1871, of septicopyæmia. The uninjured hip-joint capsule very much enlarged and filled with brown offensive pus, on the inner side it was broken through under the adductors, and communicated with a large purulent cavity. Cartilaginous covering of the head of the femur discoloured and turbid. Joint injury not to be found. No clots in the blood-vessels of the thigh.
The same.	Damaske 40th Regiment wounded, Dec. 2nd, 1870, before Orleans.	Gun-shot fracture of the left hip-joint. Entrance three fingers' breadth below the spina anter. super. Exit behind the trochanter major. Patient fell at the moment of injury	Side position.	In April, 1871, I saw the patient dying.

No.	Name of Surgeon Authority.	Name of the wounded man. Date of injuries.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
		Entered the Hospital at Homburg Feb. 14th, 1871.	and could neither stand nor walk. April 9th, the thigh was flexed and rotated outwards.		
23	A. Lücke, Prof. at Strasburg. (*Army Surgical Questions and Remarks.* P. 65.)	Wilh. Langschmid, Royal Prussian 74th Regiment, wounded Aug. 6th, 1870, near Saarbrucken. Taken to Bessingen without being dressed.	Gun-shot fracture of the hip-joint. Splintering of the acetabulum edge. Entrance behind trochanter major. Exit in front near spina anter. infer. oss. il. Hip-joint movable without pains.	Immobilisation of the leg. Drainage of the shot-canal bad. Suppuration. Aug. 27th, extraction of fragments of bone of the acetabulum and of the head of the femur.	Died Sept. 1st, of ticæmia. Pus about t hip-joint. Acetab lu split, slight injury of t head of the femur.
24	The same. P. 68.	L. B., Hessian Infantry, wounded Aug. 18th, at St. Privat. Entered Darmstadt Aug. 24.	Perforating shot through the neck of the femur inside the joint capsule. Entered in front of the right trochanter major. Bullet remained fixed. Free, painless movement in the hip-joint. No fever.	Quiet position in bed. The beginning of Sept. on account of great suppuration of the wound, a free opening was made when the shot-hole was discovered. On Sept. 8th, for the first time pain was felt in the joint with entirely free mobility of the same. General septicæmic condition with rapid loss of strength.	Died Sept. 10th, septicæmia. The bu had perforated the ne of the femur crooked without splintering, we through the obturat foramen and remained a purulent cavity ne the rectum. Hip-joi filled with morbid supp rating synovia. Int surface of the capsule the cartilages of the joi dull and tarnished. Bl let not out of shape.
25	Dr. Koch. (*Archives of Clinical Surgery.* Part xiii. P. 510.)	Kemp.	Gun-shot injury of the left hip-joint. Entered behind.		The upper part of t head of the femur w quite separated by a fr ture running from abo downwards crookedly.
26	Beck, Prof. at Freiburg. (*The War*, 1870-71. P. 600, 601.)	H., 61st Infantry Regiment, wounded Jan. 20th, 1871	Gun-shot fracture of the neck of the femur. At first the patient kept the extremity in a bent position, but later turned inward. Thigh suppuration, then shivering. Feb. 14th, severe bleeding from the suppurating wound.		Died Feb. 14th, 18 of septicæmia a hæmorrhage. Compl separation of the neck the femur by the bull which lay in the woun canal with bone splinte Ligamentum teres so flamed that the head

Name of ... rity.	Name of the wounded man. Date of injury	Nature of wound. Symptoms. Progress of the wound	Treatment.	Day of Death. Remarks.
				the femur fell out. Joint capsule destroyed.
...sume. (A. ... C., No. 2.	P., 61st Infantry Regiment. Entered the Hospital January 24th, 1871.	Gun-shot fracture of the neck of the femur. Fissure of the femur in the upper 3rd. Entered near the trochanter in the direction of the hip joint. Bullet remained fixed.		Died February 8th, 1871, of septicæmia. Complete suppuration of the soft parts round the joint.
...sume. (A. ... O. Page ... No. 3.)	H., 43rd Militia Regiment.	Gun-shot fracture of the left hip-joint. Entered close under the groin. Went out through the buttock. Upper part of the thigh shortened. Much flexed and bent inwards.	Plaster bandage.	Died six weeks after wound, of septicæmia.
...ame. (A. ..., No. 4.)	M., 4th Baden Infantry Regiment, No. 112.	Grazing shot of the neck of the femur, with opening of the joint capsule. (?) Entered close outside the femoral artery. Bullet remained fixed, and was afterwards extracted in two pieces. Little pain and fever		Died 18th day after the injury, of acute pyæmia. Between the trochanters there was stripping off of the periosteum and bone fissure of the shaft of the femur. Hip joint opened and purulent. Acetabulum showed a fissure. The rest of the misshapen bullet lay in the muscles outside the upper part of the thigh. Metastasis to the lungs.
...sure. (A. ..., No. 5.)	Name unknown of the wounded man, in the 6th Field Hospital at Montbéliard.	Intracapsular gun-shot fracture of the neck of the femur.		Died through loss of blood.
...lknann, ...ssor at ...				11—12 cases, all ended fatally.
...). Bergmann, Professor at Dorpat.				One case which ended fatally.
...-lepont, ...ctor at ...				Saw at Mars la Tours, three cases which ended fatally.
...r Koster, ... Kasten)				
...Th Frank ... MacCormac, A. F. O. 133.)	Four penetrating hip-joint wounds, fatal through pyæmia before a second operation was possible.			
...L. Keen,	Lieutenant.	Gun-shot wound of the leg and		Died August 19, 1870.

No.	Name of Surgeon. Authority.	Name of the wounded man. Date of injury.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
	Professor at Bern. (*Account of Pathological Anatomy of Gun-shot Injuries.* Leipzig, 1872. S. P. 29. No. 20.)	wounded Aug. 6th, 1870, treated in the Hospital at Carlsruhe.	shoulder-joints. Apparently the bullet went through the entire length of the neck of the femur, perforated the head of the femur, knocked off a piece of the edge of the acetabulum, and went on through the obturator foramen.		of septicæmia. at the summit of the chanter major, fr which a piece of posterior surface w arated. On the in of the acetabulum a r opening existed, thence extended th the acetabulum.
52	The same. (No. 21.)	Bertele, Wurtemburg soldier, wounded August 6th (?).	Gun-shot fracture of the right trochanter with destruction of the hip-joint. Entered in the right buttock.		Died August 1870, of septicæmia
53	The same. (P. 30, No. 22.)	Hilske, 47th Prussian Infantry Regiment, wounded August 6th, entered in Carlsruhe.	Running shot of the trochanter, shaft and head of the femur, with fissure of the joint. Bullet remained fast in a depression on the upper part of the head of the femur.	Bullet extracted with great trouble by Dr. Von Molitor.	Died August 1870, of septicæm
54	The same. (No. 23.)	Ch. M. Driset, wounded August 6th, 1870.	Gun-shot fracture of the right trochanter major, with breaking off of a piece of bone of the neck of the femur and of the cartilaginous surface of the head.		Died August 28 septicæmia.
55	The same (P. 31, No 24.)	Seidlich, wounded Aug. 9th, 1870.	Gun-shot fracture of the left femur, with separation of the trochanter major. Entered under trochanter major. Exit under the anterior superior spine of the ilium.		Died August 3 of septicæmia.
56	The same. (P. 32, No. 25.)	Jos. Gaillard, wounded Aug. 6th.	Grazing shot of the neck of the right femur. Entry a hand's width below trochanter major. Exit near the anus.		Died August 30 lung embolism and t bosis of the veins. the back of the ne the femur there v stripping off of the p teum caused by th The bone exposed discoloured and ro
57	The same. (No. 26.)	Leroy, wounded Aug. 31st, 1870.	Gun-shot fracture of the upper third of the right thigh, with lodgment in the hip-joint.		Died September 1870. Venous t bosis and lung emb
58	Dr. J. Arnold, Professor at Heidelberg. (*Anatomical Contribution to the Study of Gun-shot Wounds.* II. Heidelberg, 1873-4. Page 82, No. 165.)	Jacob Grosslin, wounded when (?)	Gun-shot injury of the left trochanter major. Entered behind trochanter, joint-capsule probably only grazed.		Died February 1871, of lung emb Joint capsule fille matter. At the part sloughing an tration of the tissu

Name of Surgeon. Authority.	Name of the wounded man. Date of injuries.	Nature of wound. Symptoms. Progress of the wound.	Treatment.	Day of Death. Remarks.
The same. (p. 32.)	Sebast. Thum, wounded Aug. 6th, 1870.	Gun-shot fracture of the head and shaft of the right femur. Opening of the shot canal under Poupart's ligament, and behind the right side of the trochanter.		Died August 29th, 1870. From the ruptured surface of the neck a fissure extended into the head of the femur. Head of bone quite separated; joint filled with pus.
The same. (page 83, No. 1.)	Gottlieb Klos, wounded Aug. 16th, at Mars la Tour.	Furrow-shot of the head of the femur. Entered behind the right trochanter. Ballet fixed in the joint.		Died September 13th, 1870, of pyæmia. Joint filled with pus.
The same. (p. 102.)	Friedr. Maass, wounded Aug. 16th, 1870, at Mars la Tour.	Gun-shot fracture of the left trochanter, head and shaft of the femur. Entry to the left of the trochanter. Ballet remained fixed in the head of the femur.		Died October 26th, 1870, of venous thrombosis. Suppurative osteomyelitis. The head of the femur almost entirely separated. Joint capsule torn by a fragment of bone. Trochanter broken off. Neck of the femur shattered. Joint capsule thickened. Cartilages of the joint defective.
The same. (p. 50.)	Wilh. Bathe, wounded Aug. 18th, at Gravelotte.	Gun-shot fracture of the upper part of the left femur, and of the left trochanter major. Ballet fixed in the ascending ramus of the left ischium.		Died September 10th, 1870, of pyæmia. Joint capsule filled with pus and splinters of bone. Articular surfaces of the femur and splintered. Acetabulum defective on its inner surface. Cellular tissue round the bladder in a state of suppuration.
The same. (page 85, No. 1.)	Andr. Worf, wounded Aug. 4th, 1870, at Wetzenburg.	Gun-shot fracture of the right acetabulum, furrow-shot of the head of the femur. Entry on the right edge of the sacrum; exit on the inside of the upper part of the right thigh.		Died September 11th, 1870, of pyæmia. The right acetabulum is defective in the middle. Cellular tissue of the smaller pelvis on the right side, suppurative, and containing a large pus-cavity.

TABLE III

GUN-SHOT INJURIES OF THE HIP-JOINT, WHICH WERE TREATED WITH RESECTION OF THE HEAD OF THE FEMUR, DURING THE GERMAN FRENCH WAR, 1870-71.

Surgeon and Authority	Name of wounded. Day and place of wounding.	Nature of the wound. Symptoms. Course of wound.	Operation.	Cured or died.	Remarks.
Prof. Langenbeck, Berlin.	Petit, of the French 67th Line Regiment, wounded Aug. 16th, 1870.	Gun-shot fracture of the right hip-joint. Entry in the front of the tuber ischii. Exit in front, outside the femoral artery.	Resection of the head of the femur by a long incision, August 30th, 1871.	Died September 15th, of pyæmia.	

No	Operator and Authority.	Name of wounded. Day and place of wounding.	Nature of the wound. Symptoms. Course of wound.	Operation.	Cured or died.	Remarks
2	The same.	Roma, Lieutenant in the 9th French Infantry Regiment, wounded August 18th. Entered the Field Hospital Villeres aux Bois, August 20th, 1870.	Gun-shot fracture of the left hip-joint. Entry under the trochanter major. Exit in the right buttock. Foot rotated outwards. Extremity shortened $\frac{1}{6}$ of an inch; much swollen. No Fever. Side position. From August 24th, a severe fever; increase of the swelling. Purulent absorption from the wound.	Resection of the head of the femur and trochanter major. Long incision, Aug. 31st, 1870. Splintering of the neck extended along the shaft of the femur to the extent of $3\frac{1}{2}$ inches.	Died September 4th, of exhaustion.	
3	The same.	Pierre Congacz, twenty-three years old, from Labertry French Garde Gren. Regiment, wounded Aug. 16th, 1870. Barracks Hospital at Gorze.	Gun-shot fracture of the neck of the left femur, with opening of the joint. Bullet fixed. Besides shot in the chest, with wound of the left lung. Finally shattering of the left foot by a shell. Thigh rotated outwards; much shortened. Enormous swelling near the joint.	Resection of the head of the femur, with removal of a long piece (2 inches) of the splintered diaphysis on Sept. 1st 1870. Operation very difficult, because of numerous displaced fragments of bone which were hard to remove.	Died September 8th, 1870, of exhaustion.	
4	The same.	Jean Muller, from Alsace, wounded Nov. 28th, 1870, at Jeanne la Rolande. Entered the Hospital at Pithiviers, Nov. 30th.	Gun-shot fracture of the left hip-joint. Entry behind the trochanter. Exit on the left side, close under the tuberculum pubis. Foot fell outwards; shortened $1\frac{3}{4}$ inches. Slight swelling of the joint; painful only on movement. General health good; no fever.	Resection of the head of the femur, December 1st, 1870. Long incision. The fractured shaft of the femur was sawn off close by the trochanter. Operation very easy, and only slight disturbance of the parts. Weight extension.	Died December 12th, 1870, of pyæmia.	On account our ma from Pi iviers, did not the wou ed ma again.
5	The same.	Petit, 67th French Regiment of the Line, wounded Aug. 16th, 1870, at Mars la Tours. Field Hospital, at St. Apolline.	Gun-shot fracture of the right hip-joint. Entry in front of the tuber ischii. Exit close outside the femoral artery. Aug. 30th, the extremity much shortened and rotated outwards. Severe pains in the joint, which is much swollen.	Resection with long incision, August 30th, 1870. Shaft of the femur broken into several fragments. Trochanter fractured; sawn off just below the trochanter major.	Died December 10th, 1870, of septico-pyæmia.	
6	The same. (Record of the Military Surgical Society at Orleans, sitting on Dec. 28th, 1870. *German Military Surgical Journal*. First year. Berlin, 1872. Page 63.)	Heinartz, Sub-Officer, twenty-three years old, 75th Infantry Regiment, wounded December 9th, 1870. Entered the Anglo-American Ambulance (Church of St. Eubert, at Orleans), December 13th, 1870.	Gun-shot wounding of the right hip-joint and of the bladder. The bullet (minié) entered about $5\frac{1}{2}$ inches under the spina anter. super. on the right side, outside the plexus femoralis, in a slanting direction, under and slightly downwards, and was cut out on the left side near the tuber ischii. Urine mixed with synovia flowed through the opening, and only slightly bloody; urine passed through the urethra when the patient rested on the left side. December 14th, much swelling and emphysema near the groin. Pressure discharges urine with	December 14th, 1870, dilatation of the wound opening and exploration with the finger showed breaking off of a piece of the inner edge of the acetabulum and opening of the joint. Resection with long incision was conducted with great ease. The bullet had broken off a piece of the inner edge of the acetabulum. Entered the joint without injuring the head of the femur, perforated the	Died December 20th, 1870.	The pati recov from operati On D 17th, ri Died septico- æmia.

...r and ...ity.	Name of wounded Day and place of wounding.	Nature of the wound. Symptoms. Course of wound.	Operation.	Cured or died.	Remarks.
		...ir bubbles and synovia. Thigh slightly flexed and rotated outwards. Active movement in the joint impossible: passive, painful. Highly feverish. Patient much exhausted after the transport to Orleans.	inner wall of the acetabulum and split it into several fragments. The head of the femur showed no trace of an injury. Through the perforation of the acetabulum, the finger passed into the pelvic cavity. Urine and pus pass through the cavity. Weight extension.		
...r. Zum-Ryl. Pr. ...ief Surgeon. (*German Mil. Surg. Journal*, 1872. 409.)	Franz Pirczo, musketeer in the 1st Oberschles Infantry Regiment, No. 22, twenty-four years old, from Mittel-Lazisk, Province Plesz, wounded Sept. 23rd, 1870, before Paris.	Gun-shot injury of the right hip-joint. Bullet fixed in the head of the femur.	Resection of the head of the femur. Date of the operation is not given. Operation was probably White's circular incision.	Cured; when is not mentioned.	Patient walked in 1872, on two crutches. Movement of resected joint not active, but at an angle of 30° passive movement is possible. Deficient in steadiness. Extremity wasted and shortened to the extent of four inches.
Dr. Hüllen, of Hanover. (*Schuller, Surgical Sketches* Hanover, 1871. P. 1) Stroyer (Macormac, *Wounds and Wound-Treatment in the Ambulance Surgeon*. P. 5.)	Fredk. John, twenty-three years old, from Berlin, 1st Brandenb. Body Gren. Regt., No. 8, wounded Aug. 6th, at Spicheren.	Gun-shot injury of the right hip joint. Entered 1½ inches below the spina ant. sup. extra. Exit through the right buttock, a hand's width from the middle of the sacrum. Was thought to be a round shot. Aug. 18th, transported from Saarbrücken to Hanover. Hip-joint not swollen, easily moved. General health good. Walked with a stick. Sept. 12th, increase of suppuration. Pain behind the trochanter major. Bending of the hip-joint. Sept. 21st, probe meets rough bone in various places. Extension of the limb under chloroform. Plaster bandage. The pains subside. Sept. 25th, decline of fever. Removal of plaster bandage. Placed in wire hose. Nov. 4th, widening of the wound opening, and extraction of a detached piece of the upper	Resection with White's circular incision. Head of the femur much affected by caries. Acetabulum widened and partly carious. Patient left his bed 60 days after the operation, and in May, 1871, is quite cured, healthy and strong. Joint slightly movable.	Cured May, 1871	Capability of using the leg not mentioned

No.	Operator and Authority.	Name of wounded. Day and place of wounding.	Nature of the wound. Symptoms. Cause of wound.	Operation.	Cured or died.	Remarks.
			and outer edge of the acetabulum. Complete suppuration discovered in the joint.			
9	Gahde, Royal Pr. Chief Surgeon. (Record of the Mil. Surgical Society at Orleans. *German Military Journal.* First year. Berlin, 1872. P. 65.)	W. Liesegang, musketeer in the 4th Brandenb. Infantry Regiment, No. 24, wounded Aug. 10th, 1870, at Mars la Tour.	Gun-shot fracture of the neck of the left femur. Entry through the left buttock, midway between the trochanter and the base of the os coccygis. Bullet remained fixed. L. fell down at the moment of injury, and was simply laid on straw. Aug. 25th, brought to the Church of Vionville. Pott's side position. Limb much swollen, especially near the joint, rotated outwards, much shortened. Active movement impossible. Severe suppuration of the wound. Bandages very painful. On that account the leg was fixed against the healthy one by laying a chaff cushion between the thighs. Sept 2nd, rather strong arterial bleeding from the wound, stopped by plugging. Recurrence of the bleeding. Dilatation of the wound was made, when a large fracture of the shaft of the femur was discovered.	Resection by long incision, on Sept. 2nd, of the head and neck of the femur, with a piece of the shaft, which was much splintered, about 1½ inches long.	Died Sept. 2nd, 1870.	The i valid v much e haust before t operat by blee ing. I did not recover c sciousn after t narco and di five ho after t operati
10	Dr. Th. Billroth, Prof. at Vienna. (*Surgical Letters from the Army Hospitals* Berlin, 1872. S. P. 227. No. 3.)	Chas. Pacot, French 50th Infantry Regiment, wounded Aug. 4th, 1870	Gun-shot fracture of the neck of the right femur. Entered behind. Bullet remained in.	Resection of the cap. fem. dextra, Aug 20th, 1870.	Died Aug. 20th, of pyæmia.	
11	The same. (A. A. O. P. 228.)	Edward Geier, 9th Royal Bavarian Regt.	Shot from behind, through the hip-joint. Wound of joint undiscovered.	28th of Sept., 1870, extraction of the necrosed head of the femur.	Died Oct. 27th.	An recogni failure.
12	The same. (A. A. O. S. 241.)	Name of wounded unknown, in the Hospital at Bergzabern.	Gun-shot fracture of the hip-joint. Entry in front above the hip-joint, close to the femoral nerve. Bullet remained in. All appearances the same as in extra-capsular fracture of the neck of the femur.	Extraction of the bullet and of the detached upper part of the head of the femur, which is sloughing, by means of dilatation of the wound, about three weeks after the injury.	Died twenty-four hours after the operation.	Pati was s ticæmic the ti of the operati and l spread bedsore
13	Gen. Surgeon, Dr. Wegner. (Dr. C.	Name of the wounded unknown, wounded Sept. 19th,	Gun-shot fracture of the neck of the left femur. Entry behind the left trochanter. Exit inside the upper part of the	Oct. 20th, long incision behind the trochanter major. Sawn off below the trochan-	Died Oct. 20th, 1870, of pyæmia.	

[illegible] and authority.	Name of wounded. Day and place of wounding.	Nature of the wound. Symptoms. Course of wound.	Operation.	Cured or died.	Remarks.
[illegible]chner. [illegible] A.O. P. [illegible]	1870.	thigh close under the pelvic commissure. Leg shortened $1\frac{1}{2}$ inches. Foot was not rotated outwards. Crepitation near the trochanter. Splinters of bone in the shot-canal. Slight pain.	ter. Joint full of pus. Pelvis unwounded. Treatment with permanent extension, later on double inclined plane.		
[illegible] K[illegible], [illegible]in. (Report of the [illegible] German Surgical Congress Berlin Clinical [illegible] [illegible], 1873. [illegible] 22. P. [illegible])	Name unknown.	Gun-shot injury of the pelvis. Secondary suppuration of the hip-joint (?). Entry in the left buttock. Bullet divided itself in the bone, one part went forward and was [illegible] near the spina anter. super., the other part perforated the ilium, and went into the pelvis. The wound healed, leaving only a fistula. Patient was [illegible] sudden symptoms of hip-joint inflammation.	Resection leaving the trochanter. Later resection of the head of the femur, half of which was destroyed.	Died eight days after the operation.	
[illegible] Fischer, [illegible] at [illegible]. (A. [illegible] P. 200. [illegible] 326)	Weinert, sub-officer in the Ostpr. Dragoon Regt., wounded Aug. 14th, 1870. Entered the Hospital at Neunkirchen August 18th.	Gun-shot injury of the left hip-joint. Simple capsule wound. [illegible] over the trochanter major. [illegible] the inner side. Bullet removed. The [illegible] pains in the joint diminished after the extraction of the ball. August 31st, shivering, pains in the [illegible], sensitiveness of the hip-joint on pressure. September [illegible], secondary [illegible].	September 6th, 1870, by angular incision above the trochanter major, the hip-joint being destroyed, the head and neck were removed. Head of the femur [illegible].	Died Sep. 15th, 1870	Patient recovered after the operation. September 10th, renewed shiverings.
[illegible] Lucke, [illegible] at [illegible]burg. [illegible] Sur[illegible] ([illegible] [illegible]). Page [illegible]	E. W. H[illegible], Prussian Guardsman, wounded Aug. 15th, 1870, at St. Privat. Entered the Hospital at Darmstadt August 27th (without bandage).	Gun-shot fracture of the head of the left femur and of the right upper [illegible]. [illegible] of the chest. Entry in front of left trochanter major; exit through buttock. [illegible] of the left leg. Good suppuration. Little fever.	[illegible] apparatus. Resection, Sep. 5th, of the head of the femur, which was [illegible]. Strong [illegible] during the operation.	Died [illegible] days after the operation.	
Hueter, [illegible] at [illegible]wald. [illegible] of [illegible] Second German Surgical Congress, [illegible] [illegible])	A wounded soldier of the Royal Würtemberg Division.		Resection of the head of the femur.		Result unknown.
[illegible] Hep[illegible], [illegible] of St. [illegible], [illegible] same,			Two late resections, conducted in the Hospital at Saarbrucken.	Two died.	

No.	Operator and Authority	Name of wounded. Day and place of wounding.	Nature of the wound. Symptoms. Cause of wound.	Operation.	Cured or died.	Remarks.
	Page 260.)					
20 21 & 22	Volkmann, Professor at Halle. (Collected Clinical Statements, No. 51, P. 301. Beck, A. A. O. P. 895. No. 3.)				Three died.	Two the sected died of conse the vaihn sore. the th there exter shatte of pelvis.
23	Dr. Welker. (Beck, Professor in Freiburg. The War, 1870-71. P. 890-893.)	B., 2nd Z. Regt., wounded at Worth. Treated in the Hospital at Bischweiler.	Gun-shot fracture of the neck of the femur above the trochanter major. Entry at the front of the thigh, bullet remaining in. Healing of the wound, except two fistulæ, through which the probe touches exposed bone. Foot much rotated inwards, shortening.	Extraction of the necrosed head of the femur, with half the neck, six months after the injury.	Cured.	
24	Operator, name unknown. (Beck A. A. O. P. 892, No. 2.)	P., 4 W. Infantry Regiment, No. 17.	Shot in the right hip-joint. Ball remained fixed in the upper part of the head of the femur.	Late resection of the head of the femur.	Cured.	Pa was c A kin joint form that v activ and pa ly m able if in a si degr Extr short upwa two i
25	Czerny, Professor at Bern. (From the Army Hospitals, *Vienna Medical Weekly Journal.* 1870, No. 49.)			Resection of the head of the femur.	Died.	
2	A. Wagner, Ten. Professor at Königsberg. Dr. Korts,	Piasetzky, wounded Aug. 8th, 1870.	Gun-shot fracture of the neck of the left femur.	Resection of the head of the femur, Sept. 28, 1870. Considerable infiltration of the soft parts and high sep tic	Died.	De follo ten d after operat

...or and ...thority.	Name of wounded. Day and place of wounding	Nature of the wound. Symptoms. Course of wound.	Operation.	Cured or died.	Remarks.
...ives of ...ical Sur- ... Vol. ... P. 510.)			fever.		
Graef, ...irecting ...rgeon of ... Infirm- ...es at El- ...rfeld. ...try.)			Extraction of the head of the femur.	Died.	
...B. Beck. ... A. O. ...893.)	H., 3rd Prussian F. Pioneer Company.	Gun-shot fracture of the neck of the femur and of the trochanter major on the left side. Bullet removed by incision at the dressing place from the left buttock.	Resection of the head of the femur the evening of the injury. Extremities placed in an extended position.	Died.	Death nine days after the injury and operation of septicæmia. Sloughing of the soft parts round the wound. Embolism of the lungs and infarction on both sides.
...r. Pagen- ...cher. ...k. A. A. ...P. 894.)	P., 58th Infantry Regiment, wounded Aug. 6th, 1871.	Gun-shot fracture of the neck of the left femur and of the trochanter major. Entry through the left buttock.	Resection of the head of the femur and of the trochanter on the 1st September, after considerable sloughing of the soft parts was already present.	Died.	Died of pyæmia on the ninth day. On the second day after the operation suppuration commenced.
...B. Beck. ... A. O. ...894, No.	B., Sergeant-Major, 3rd French Line Infantry Regiment, wounded Aug. 6th, 1870.	Gun-shot fracture of the right trochanter and of the neck of the femur as far as the diaphysis. Bullet remained in. Dislocation not relieved by lying on an inclined plane. August 22nd, removal of a piece of the bullet and several bone splinters. Plaster bandage and leg extended. Bed sores. Strength failing.	Resection of the head of the femur with the upper third of the femur. Favourable influence of the operation. Patient sleeps lying on his face, and receives strength.	Died.	Death from pyæmia.
...r. Battle- ...er, at ...enbuhe. ...Hilfe, A. ...D. I. 33, ...p. 20.)		Gun-shot fracture of the os femoris with dislocation of the head of the femur.	Resection of the head of the femur as far as the trochanter.	Died.	Parts of bone removed consisted of three pieces; the head of the femur broken off close to its edge, the

No.	Operator and Authority.	Name of wounded. Day and place of wounding.	Nature of the wound. Symptoms. Course of wound.	Operation.	Cured or died.	Remarks
						troch a major the p of th physi off.

TABLE IV.

GUN-SHOT INJURIES TREATED BY DISARTICULATION OF THE FEMUR.

No.	Operator and Authority.	Name of wounded Day of Injury.	Nature of the Injury. Course.	Treatment	Result.
1	Ott. (*Army Surgical Accounts from the Reserve Hospital at Ludwigsburg.* Stuttgart, 1871. 4. P. 52.)	Harles, French soldier, wounded Aug. 16th, 1870. Admitted Aug. 26th.	Complete shattering of the right femur, close under the trochanter major. Doubtful condition of the hip-joint, and probable luxation of the head of the femur. Sloughing. Disarticulation refused earlier. Strength exhausted. Œdema of the legs.	Disarticulation of the femur, with anterior flaps. Sept. 24th, 1870, bleeding inconsiderable, but too strong for the exhausted patient.	Death in a few h after the operation.
2	Mundy. (*Rapport sur l'ambulance de l'ancien corps legislat, du 19 Septr.*, 1871, *au 31 Janvier*, 1871.	Deschamp, 2nd Zouave Regiment.	Gun-shot fracture of the right thigh, with injury to the large blood-vessels and of the hip-joint by a shell, with frost gangrene.	Disarticulation of the femur Dec. 2nd.	Died twelve hours a the operation.
3 & 4	Böhme (*Gähde German Mil. Surgical Journal*, I. P. 66.)		Gun-shot fracture of the end of the femur below the trochanter. Violent arterial bleeding. Deligation of the femoral artery. Bleeding returns. No account of the second case.	Disarticulation of the femur with oval flaps.	Died during the o tion from loss of bl Death after sev days.
5	O. St. A. Rüppel. (The same.)		Soft parts of the upper part of the thigh much injured.	Disarticulation of the head of the femur.	Died soon after t operation.
6	Simon.	French officer.	Oblique fracture of the thigh.	Disart. fem.	Died three days af the operation.
7	Hueter, Prof. at Greifswald. (Record of the 2nd German Surgical Congress, 1873. P. 19.)	French. Wounded.	Upper part of the thigh much shattered.	Disart. fem.	Death the day af the operation fr hæmorrhage.
	W. Busch, Prof. at Bonn. (The same.)			Two disarticulations of the thigh.	Result fatal.

...t and ...thority.	Name of wounded. Day of Injury.	Nature of the Injury. Course.	Treatment.	Result.
...r. Philip ...k, Temporary Surgeon the Anglo ...rican Ambulance at ...lan and ...zeilles. ...c Cormac, ...A.O. P.)			I. primary. I. secondary. Disarticulation of the thigh.	Fatal result.
...r. Blewitt. ...c Cormac, ...A.O. P.)			Disarticulation of the hip joint, at Balan (after the Battle at Sedan).	Fatal result.
...F. Mac Cor... (Notes & ...niscences ...an Ambulance Surgeon, ...n the Eng... of Dr. Louis ...romeyer, ...nover, ...L.)	Guerieri, marine soldier, wounded Sept. 4th, 1870, at Sedan. Entered at Asfeld Sept. 10th.	Extensive shattering of the upper part of the left thigh bone, chiefly the trochanter, and of the left tibia. Patient much exhausted, recovered slightly until Sept. 10th.	Disarticulation fem., Sept. 18th, anterior flap. Femoral artery was twisted.	Death soon after the operation. Mac Cormac thinks (no doubt rightly) that chloroform was the cause of the early death.
The same. ...A.O. 30th ...)	Lepreni...	Considerable laceration of the soft parts on the outside of left thigh. Bones and principal vessels uninjured.	Immediately after the attempt had been made to retain the extremity Mac Cormac performed disarticulation of the femur with large anterior flap. Femoral artery secured by torsion.	Died of exhaustion six days after the operation. Patient recovered from the operation. Pulse 120 strong; appetite and sleep good. On the 6th day, when the French Intendant had run away, I. could neither food nor wine, became very weak, and died during the night.

APPENDIX.

OTIS gives in his *Report on Amputations at the Hip-joint in Military Surgery. Circular No. 7*, Washington, 1876, an historical summary of all the cases of amputation at the hip which had been performed up to that date. He quotes many English authorities, as Guthrie, *A Treatise on Gun-shot Wounds*, third edition, pp. 334-342: and Longmore—*Holmes' System of Surgery*, vol. 2, p. 82, and also gives an account of Langenbeck's experience of the Schleswig-Holstein war of 1848-49, to the effect that of five amputations at the hip, four died, and one, a youth of seventeen, recovered.

In the Crimean war of 1854-55, there were forty-four cases; two in the Sardinian, eight in the Russian, fourteen in the English and twenty in the French army, and all proved fatal.

In the Italian war of 1859, there were nine amputations, and of these six died. One secondary amputation by Isnard, at Brescia, recovered, and two secondary amputations performed six months after the injury, were successful. He mentions that of 108 well authenticated cases of amputation in military surgery, there were only ten recoveries: one after primary, four intermediate and five secondary operations, giving altogether a mortality of 91.66 per cent., while of 111 cases in civil surgery, there were forty-six successes, and sixty-five fatal cases, or a mortality of 58.56 per cent.

In civil surgery there were eight successes and fifteen failures in France, seven successes and eight failures in Germany, sixteen successes and thirty-one failures in England, and fifteen successes and nine failures in America; among the English cases four were re-amputations, one case (that of a child aged two years) was for injury, and the rest were for disease.

These statistics of amputation at the hip-joint in civil practice seem so flattering that Otis has probably a just reason for saying that there is a "suspicion that all the unfortunate cases have not been published."

There were fifty-three authenticated cases of hip-joint amputation in the war of the Rebellion; thirty-four in the United States and nineteen in the rebel army.

The old division into primary and secondary amputations Otis considers insufficient, therefore he divides them into four classes :—

1.—Primary, those performed within twenty-four hours.

2.—Intermediate, those performed up to two or three months.

3.—Secondary, those performed when inflammation has abated and the condition is like that produced by chronic disease.

4.—Re-amputations.

Class 1.—Nineteen cases, average time after injury seven and a half hours, eleven died in less than ten hours, three in two days, two in eight or ten days, three recovered. Mortality 84.21 per cent.

Class 2.—Intermediate, *i.e.*, during the inflammation period, on an average ten days after the wound. Eighteen cases, all fatal, five died from shock at an average of fifty-two hours after the operation, one from pyæmia, two from gangrene, two from hæmorrhage, and eight from exhaustion and suppuration.

Class 3.—Secondary. Nine cases, two recoveries, seven deaths. Mortality 77.78 per cent. Three died from shock, one from phthisis after seventeen weeks, one from hæmorrhage on the tenth day, one from erysipelas on third day, one from secondary hæmorrhage and syphilis after twenty-three days, average period twenty-two days.

Class 4.—Re-amputation. Seven cases, four recoveries. Mortality 42.85. Two died from shock in a few hours, one from pyæmia in eight days. In the four successful cases the average interval was fifteen months, and in the three fatal, two years.

In civil surgery there are ten cases of re-amputation on record, of these eight recovered and two died. Mortality of 20 per cent.

Otis says that amputation at the hip-joint is justifiable in the following cases :—

1.—When the thigh is torn away high up by a large projectile.

2.—When the thigh is comminuted by a shot or shell and the soft parts lacerated so close to the trunk as to forbid the idea of amputation in the continuity of the limb.

3.—Fracture of the upper third of the femur with wound of the femoral vessels.

All amputations to be successful should be done immediately and not delayed till the second period.

In this report Otis only treats of cases of amputation at the hip-joint, but Langenbeck's essay is more complete in that it also deals with cases treated conservatively, cases of resection and also cases treated by amputation at the hip. His tables may be thus summarised :—

1.—Gun-shot injuries of the hip treated conservatively which were followed by recovery, twenty-five cases.

2.—Gun-shot injuries treated conservatively which proved fatal, sixty-three cases.

3.—Gun-shot injuries treated by resection, thirty-one cases, of which twenty-six died, four were cured, and one case, that of Hueter, in which the result was unknown.

4.—Gun shot injuries of the hip treated by disarticulation, all of which proved fatal, thirteen cases.

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RIGHT

GUTTERS